pp. 659-742] July, 1952

TROPICAL DISEASES BULLETIN

VOL. 49] 1952 [No. 7

MAIN CONTENTS

For detailed Contents see pp. ii, iv, vi, viii, x and xii.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1
(Telephone: MUSEUM 3041)

Price 5/6 net] *Entered as Second Class Matter in the U.S.A. Post.* Annual Subscription (Jan.–Dec.) 50/-

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 49] 1952 [No. 7

SUMMARY OF RECENT ABSTRACTS*

VI. PLAGUE

General : Epidemiology

GIRARD (p. 983) has written an account of the contribution made to our knowledge of plague, by workers in Madagascar, of whom he has been a most active leader.

SHARIF (p. 983) has examined the subject of the spread of plague in the Bombay Province, and concludes that the disease there is maintained solely by domestic rats, the degree of prevalence depending on the activities of rat fleas, which in turn depend on seasonal climatic conditions. In certain places human plague dies out in the hot dry season, but some rats in the open country remain infected, and may be driven into human dwellings at the onset of the rains. Conditions are then favourable for multiplication of rat fleas and spread of disease to man. In bigger commercial centres the rats have largely become immune, but the infection survives in a few susceptible rodents, whose fleas may be transported elsewhere in grain, to start explosive outbreaks. In hot lowland areas outbreaks tend to die out in the hot season, but in cooler hill tracts infection tends to persist throughout the year. In India and Pakistan there are 7 main centres of infection.

GROSS and BONNET (p. 548) give an account of plague on the island of Hawaii.

Several cases of plague in persons who had had contact with wild rodents in New Mexico are reported by LINK (p. 146). He (pp. 548, 1105) gives general accounts of the disease in North America.

Animal Hosts : Transmission

SWELLENGREBEL (p. 146) has written an account of plague in Java in 1910–12, and the difficulties encountered in proving that there, as in India, the rat was the origin of the human disease. This most interesting paper should be read in full.

JANY (p. 985) has studied the tree-climbing habits of *R. norvegicus*.

MEUNIER (p. 731) discusses the control of rats in Algeria. *Rattus rattus* occurs in towns but is commonest in dock areas and accounts for 95 per cent.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

of the rats found in ships. The predominant rat flea is *Xenopsylla cheopis* which accounted for 97 per cent. of the total in summer, and 23 per cent. in winter.

HOPKINS (p. 460) has written a monograph on plague in Uganda, with an account of the rats and fleas. *R. rattus* is present in many huts and in these places *R. coucha ugandae* has been forced to become a field rat. Outbreaks almost always begin in rural areas where *X. brasiliensis* is common on the hut rats, and this flea is therefore the most important in relation to plague, though *X. cheopis* is present on rats in townships in the south, and on house-haunting rats in the north.

In reporting a survey of fleas on domestic rats in Hong Kong, ROMER (p. 549) shows that the *X. cheopis* index is lowest (0·6–0·9) in July–September, and highest (3·4–5·7) in March–April.

Aetiology

YAOI *et al.* (p. 629) have studied the growth of *Pasteurella pestis* in a basic medium in which there was progressive retardation of growth of virulent strains. Various substances were added to test their effect on growth.

LEVINE and GARBER (p. 145) show that on tryptose (Difco) agar containing triphenyl tetrazolium chloride, differentiation between rough and smooth colonies of *P. pestis* can readily be made. GARBER *et al.* (p. 805) describe an improvement on this medium.

SOKHEY *et al.* (p. 256) have used a modification of the Mueller and Johnson acid hydrolysate medium for cultivation of *P. pestis* for preparation of vaccine. The best results were obtained when the medium was treated twice with charcoal, and after Tween 80 had been added. SEAL and MUKHERJI (p. 985) describe a fluid medium, free from non-specific proteins, for the cultivation of *P. pestis*. The resulting vaccine was less toxic to mice than the Haffkine broth vaccine, more potent and less costly. By adding 2·5 per cent. agar to this medium SEAL (p. 985) obtained much better growth than on nutrient agar. He found it nearly as good as rabbit-blood medium for counting living *P. pestis* in broth, and it has certain advantages over rabbit-blood media.

MATUMOTO (p. 36) has worked on the fermentation of glycerin by *P. pestis*, and his results tend to corroborate the impression reported by other workers that glycerin-positive strains have originated from the Russia-Central-Asia-Mongolia focus of plague, and glycerin-negative strains from the Eastern Himalaya focus. DEVIGNAT and BOIVIN (p. 984) show that all of 42 strains of *P. pestis* isolated in the Belgian Congo fermented glycerin. They suggest that strains of this kind should be known as " the ancient variety of plague".

AMIES (p. 1105) believes that the so-called envelope of *P. pestis* is nothing more than a particularly well-developed capsule. It can be removed by certain aqueous solvents and the antigen can be concentrated and appears to be a simple protein.

Tests

A rapid quantitative agglutination test with various dilutions of serum, and a suspension of *P. pestis*, is described by DEVIGNAT (p. 986). The titres observed were found to agree closely to those occurring in tube tests. He (p. 986) describes two other tests with plague antigen adsorbed on collodion, or plague antibody adsorbed in the same way. The significance of these is not known. Details should be sought in the original.

Treatment

In the report of the WHO Expert Committee on Plague (p. 251) a note is made that streptomycin is proving to be the best therapeutic agent, and that

for protection of contacts of pneumonic plague daily doses of 3·0 gm. of sulphadiazine or sulphamerazine should be given. The report also contains information on the identification of *P. pestis*, the examination of rats, etc.

MEYER (p. 253) sums up modern practice in the treatment of plague, and from a consideration of the findings of many workers he suggests that streptomycin should be used in doses of 4 gm. daily, but the dose can safely be reduced "on the third or fourth day of recovery". After the fifth day it may be replaced by sulphadiazine or sulphamerazine in daily doses of 4 gm. In severe septicaemic or pneumonic plague the initial daily dose of streptomycin should be supplemented by oral aureomycin, chloramphenicol or terramycin (2–4 gm.) and immune rabbit serum globulin. Contacts of pneumonic plague should be given 2–3 gm. sulphadiazine or sulphamerazine daily for 5 days, and if symptoms occur they should be given intensive antibiotic treatment.

LINK (p. 1105) recommends streptomycin 0·25–1·0 gm. every 4 hours until defervescence ; sulphadiazine is given simultaneously in an initial dose of 4·0 gm. followed by 1·5 to 2·0 gm. every 4 hours, and is continued for 10–15 days after defervescence.

SOULAGE *et al.* (p. 253) have treated 14 consecutive cases of plague successfully with streptomycin 0·5 gm. every 3–4 hours until the temperature became normal, and then with a daily total of 1·0 gm. (in smaller doses) to a total of 15 gm. This was followed with a course of sulphonamide, the best being sulphamethyldiazine and sulphadiazine.

GHOSH (p. 461) gave one to four injections of 0·5 gm. streptomycin to 155 patients with plague. There were only 6 deaths, of which 5 were of patients moribund on admission.

NÉEL (p. 629) has shown that streptomycin has a striking curative action in pneumonic plague in guineapigs. The results indicate that in man streptomycin may greatly reduce the length of time during which patients with pneumonic plague remain infective.

QUAN *et al.* (p. 254) show that aureomycin and terramycin have some action against the toxin of *P. pestis*. Chloramphenicol has less action, and streptomycin none.

Control

An account of the measures successfully taken to control an outbreak of plague in Taranto, Italy, in 1945–46 is given by SCHULZ (p. 36) who describes how the widespread use of DDT by the British authorities, with isolation of patients, inoculation of contacts, and a campaign of rat poisoning, brought the outbreak to an end.

In the Report of the Scientific Advisory Board of the Indian Research Fund Association for 1949 (p. 252) FRANCIS states that whereas plague had occurred in 45 of 468 villages fumigated with Cyanogas every 3–4 months, it had not occurred in any of 90 treated once with 10 per cent. DDT dust.

CHITTY and KEMPSON (p. 252) discuss the trapping of field rodents.

Charles Wilcocks

MALARIA

LEE, D. J. **Mosquito Surveys in the Northern Territory.** *Health.* Canberra. 1951, Dec., v. 1, No. 4, 21–3.

This is a semipopular paper which discusses in a very general way the contribution which has been made by mosquito surveys to the better understanding of disease transmission, particularly epidemic malaria, in the Northern

Territories of Australia. These surveys, made since 1911, have been intermittent, and mostly during the dry season when mosquito activity is minimal. By 1943, 7 species of *Anopheles* had been recorded, but none of them has any marked preference for human blood and it is not known which species are vectors of malaria. The sporadic epidemics of malaria may be caused by introductions of more efficient vector species of *Anopheles* which later die out. Though there is no direct evidence of such introductions, there are good Anopheline breeding places and a concentration of human hosts near Darwin airport, so that the large amount of incoming air traffic presents a constant, potential danger. *A. J. P. Goodchild*

GIGLIOLI, G. **The Influence of Geological Formation and Soil Characteristics on the Distribution of Malaria and its Mosquito Carrier in British Guiana.** Reprinted from *Timehri* (*J. Roy. & Agric. Commerc. Soc. B.G.*). 1951, v. 30, 9 pp., 1 map.

This is an account for non-medical readers of past and present practice and policy for the control of *Anopheles darlingi*, vector of malaria in British Guiana. This mosquito is naturally a forest species, breeding in water, with, at most, a slight acidity (*p*H value not less than 5). In recent years it has been eradicated from the cultivated coastal strip by residual sprayings of DDT in premises and houses. But it still occurs in the hinterland. The coastal area is fortunately placed in that it has considerable protection from re-invasion from the hinterland by the presence of acid, peaty, swamps at the foot of hills of white quartz sand leading to the inland peneplain. The waters of the swamps, which are partly used to feed the irrigation systems of the cultivated coastal area, are highly acid and do not breed *A. darlingi*. This barrier of natural protection is, however, breached by some of the rivers coursing down from the hills to the sea ; the water is clear, suitable for breeding, and breeding places occur along their banks of alluvial clay. To maintain eradication of *A. darlingi* in the coastal zone, in which about 90 per cent. of the people live, it is necessary only to continue periodic residual spraying in premises along the lines of the rivers. This policy is based on a sound knowledge of the biological characteristics of the mosquito : it ensures protection with remarkably light costs in labour and resources. This strategic attack upon *A. darlingi* must be maintained since the continuing development of the coastal strip must mean ever-increasing breeding facilities for the vector, should it succeed in returning.

There are many interesting aspects of the work woven into the main theme. Thus, the conversion of acid, peaty water to suitable breeding places by washings from bauxite ore, or following certain processes in hydraulic mining, were among the most interesting of artificially created breeding places in the coastal area. It is described how rain water percolating through the quartz hills has taken with it colloidal elements of the surface vegetation and humus to the underlying clay ; this has formed a black stratum of organic material from which the water acquires some of its acidity before it gravitates to the low-lying swamps behind the inhabited coastal strip. *D. S. Bertram*

ANDREWS, W. H. H. & MAEGRAITH, B. G. **Studies on the Liver Circulation. III.—The Vascular Responses of the Perfused Canine Liver to Adrenaline and Acetylcholine.** *Ann. Trop. Med. & Parasit.* 1951, Dec., v. 45, Nos. 3/4, 255–60, 4 figs. [10 refs.]

" 1. The canine liver has been perfused by a technique designed to minimize the occurrence of hepatic anoxia.

" 2. The perfused liver may exist in one of two states, a ' red,' in which we believe that its vascular condition is probably disturbed minimally, and a ' blue,' in which there is hepatic venous constriction.

" 3. Adrenaline reduces the blood inflow in both red and blue livers. It reduces the outflow in the red liver and increases it in the blue liver.

" 4. Acetylcholine constricts the hepatic veins in the red liver ; this effect is far more marked when the drug is injected into the hepatic artery than when it is injected into the portal vein. It has little action on the blue liver, possibly because of prevailing hepatic venous constriction."

OOSTERHUIS, G. J. **Purpura in Malaria Patients.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, Mar., v. 4, No. 1, 85–7.

" Report on two cases of benign tertian malaria combined with thrombopenic purpura. The first case was caused by hypersensitivity to quinine. The second patient had inhibition of the bone marrow, probably caused by chronic malarial infection.

" The differential diagnosis as regards haemorrhagic malaria is discussed."

NAJIB KHAN, JANAKI, L., NAIR, P. M. & SURI, R. M. **Observations on Paludrine in Malaria.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 165–70.

" The study of 427 malaria patients treated with 4 different doses of paludrine is given. The clearance of peripheral blood of trophozoites was on the average 1·5–1·8 days and period of pyrexia 2·8–3·3 days. The higher dose of paludrine (600 mg.) and the lower dose of 300 mg. a day, gave similar results. Comparison is made with the effect of mepacrine, and mepacrine combined with quinine, from which it appears that paludrine clears the peripheral blood of trophozoites quicker than either mepacrine or quinine combined with mepacrine, but the period of pyrexia is longer in paludrine and shortest in quinine combined with mepacrine treatment."

MCGREGOR, I. A. & SMITH, D. A. **Daraprim in Treatment of Malaria. A Study of its Effects in Falciparum and Quartan Infections in West Africa.** *Brit. Med. J.* 1952, Apr. 5, 730–32.

Thirty-two African patients suffering from malaria at Fajara, Gambia, West Africa, were divided into 4 groups composed respectively of 18 infants aged from 4 to 24 months, 7 children from 2½ to 5 years and 4 adults, all with *P. falciparum* infections, and 3 children of 1½ to 4½ years with *P. malariae* infections. All the subjects were treated with a single dose of Daraprim [BW. 50–63 : see this *Bulletin*, 1952, v. 49, 11]. Eight babies in the first group, one in the second and the 4 adults received 0·25 mgm. per kgm. body weight and the remainder 0·5 mgm. per kgm.

In all the *P. falciparum* infections except two, asexual parasites were no longer observed in the peripheral blood 72 hours after treatment, and the temperature had dropped to normal by that time. In two cases asexual parasites did not disappear. In one of these a second dose of 0·5 mgm. per kgm. was given 15 days after the original dose of 0·25 mgm. per kgm., after which parasites disappeared within 72 hours. In the second case, on the same dosage, there was at first a satisfactory response, but the child was readmitted after 14 days with heavy parasitaemia which did not respond to doses of 0·25 mgm. per kgm. given on two occasions and of 0·5 mgm. per kgm. given once,

at approximately weekly intervals. In the 3 quartan cases, asexual parasites persisted in diminishing numbers beyond 72 hours, but were no longer observed 96 hours after treatment. No toxic phenomena which could be attributed unequivocally to the action of the drug were noted.

The authors conclude that Daraprim is likely to prove a valuable antimalarial drug, resembling proguanil in regard to its effect on clinical symptoms and being apparently intermediate between proguanil and chloroquine as regards rapidity of action on parasitaemia. *G. Covell*

GOODWIN, L. G. **Daraprim (B.W. 50–63)—a New Antimalarial. Trials in Human Volunteers.** *Brit. Med. J.* 1952, Apr. 5, 732–4, 1 chart.

In the course of a tour in certain malarious parts of Africa from January to June 1951, the author subjected himself to a personal trial of Daraprim as a preventive of malaria. From December 5, 1950 until February 11, 1951, he took 50 mgm. of the drug twice weekly. No ill-effects were noted and the blood picture and urine were normal throughout. From February 12 to April 4 the dose was increased to 25 mgm. daily, again with no apparent ill-effect. From April 4 to the end of the year the dose was reduced to 5 mgm. per day. On February 16, 17 and 18 doses of 50 mgm. were taken, and on October 1 and November 26, doses of 25 mgm. Doses of 100 mgm. were taken on December 4 and 19 for the purpose of estimating blood levels. The blood picture was normal at the end of the year's experiment and a sternal puncture showed normal blood marrow. There was no abnormality of the urine at any time and no effect at any dose level on appetite or digestion.

During the tour in Africa several expeditions were made into the bush, and on three of these no mosquito net was used. In Nairobi, on the return journey, while taking 5 mgm. daily, the author allowed himself to be bitten by 4 *Anopheles gambiae* in which sporozoites of *P. falciparum* were shown to be present in the salivary glands after biting. No malarial attack resulted from this incident.

The author concludes that in his personal experience Daraprim in a dose of 5 mgm. per day proved a satisfactory suppressant of *P. falciparum* malaria and produced no ill-effects of any kind when taken continuously over a period of one year.

Toxicity tests on 13 volunteers residing in England are also recorded. On a dosage of 50 mgm. twice weekly for 3 months, 11 of the subjects experienced no unpleasant symptoms of any kind. In two there were complaints of slight gastro-intestinal upset. No significant changes were observed in the red or white cell counts, sedimentation rates or in the urine. *G. Covell*

SCHNEIDER, J., CANET, J. & DUPOUX, R. Traitement curatif du paludisme par une 2–4 diaminopyrimidine. Premiers résultats. [**Preliminary Results of Treatment of Malaria with a 2: 4-diaminopyrimidine (B.W. 50–63, Daraprim)**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 33–43.

One hundred and thirty-two patients suffering from malaria were treated with B.W. 50–63 (Daraprim) between the end of July and mid-October, 1951. Thirty-six (15 *P. vivax*, 20 *P. falciparum* and 1 mixed *P. vivax* and *P. falciparum*) were treated in hospitals in Tunisia, and 96 others (16 *P. vivax*. 80 *P. falciparum*) in a hospital at Quanloi, Indochina. In both series the subjects were indigenous inhabitants of the countries in which the observations were carried out, and presumably most of them possessed a considerable degree of

tolerance to the disease. This applies particularly to the Indochina group, whose homes were in an area described as one of permanent high endemicity.

In Tunisia 5 régimes of dosage were employed :—

(i) 25 mgm. daily for 5 days.
(ii) 50 mgm. in a single dose.
(iii) 50 mgm. daily on 2 consecutive days.
(iv) 30 mgm. daily for 5 days (one case only).
(v) 100 mgm. daily on 2 consecutive days.

In Indochina the same régimes were used, except that régime (v) was replaced by one consisting of 30 mgm. on the first day, 25 mgm. on the second, 20 mgm. on the third and 15 mgm. on each of the 3 following days. The drug was administered orally in all cases in the form of either the hydrochloride or the base (the dose is expressed in all cases in terms of the base).

Very similar results were obtained in both countries. A total dosage of 50 mgm. gave satisfactory results in the majority of cases, while a dose of 50 mgm. on each of 2 consecutive days proved as effective as any larger dosage used. No difference in action was noted between the salt and the base. The average duration of pyrexia and of parasitaemia are shown in the following table, in which is included also figures relating to the treatment of malaria among indigenous inhabitants of north Africa with nivaquine [chloroquine] and with proguanil presented at the 4th Congress on Tropical Medicine and Malaria held at Washington in 1948.

Plasmodium	Drug used	Duration of pyrexia	Duration of parasitaemia
vivax	Chloroquine	1·62 days	2·20 days
	Proguanil	2·77 ,,	3·88 ,,
	Daraprim (Tunisia) ...	1·53 ,,	2·23 ,,
	Daraprim (Indochina) ...	1·82 ,,	2·23 ,,
falciparum ...	Chloroquine	1·70 ,,	2·76 ,,
	Proguanil	1·77 ,,	2·40 ,,
	Daraprim (Tunisia) ...	1·60 ,,	1·25 ,,
	Daraprim (Indochina) ...	1·63 ,,	1·56 ,,

On the basis of these figures it is concluded that as regards the effect on the duration of pyrexia and parasitaemia, Daraprim is more active than proguanil and even than chloroquine in *P. falciparum* infections, and more active than proguanil though slightly less active than chloroquine in *P. vivax* infections. The patients did not however appear to regain their full health as rapidly as when treated with other anti-malarial drugs, asthenia persisting for one or two days longer. No signs of toxicity were observed in any of the subjects treated, and the tastelessness of the drug was one of its most notable features.

The number of cases treated was too few and the duration of observation too short to warrant definite conclusions as regards radical cure. One of the *P. falciparum* cases relapsed with pyrexia and parasitaemia within 21 days, and the opinion is expressed that it may prove necessary to adopt a maintenance treatment for some days or weeks after the attack, or to employ one or other of the 8-aminoquinoline series of drugs as an adjuvant.

The authors believe that if these preliminary results are confirmed and if their fears as to the possible production of Daraprim-resistant strains of parasite prove unfounded, the drug is likely to be widely used for the mass treatment of malaria and probably also for mass prophylaxis. *G. Covell*

SCHNEIDER, J., MONTÉZIN, G. & BIHEU, O. Étude expérimentale de l'activité antipaludique d'une 2–4 diaminopyrimidine. [**Experimental Investigation of the Anti-Malarial Activity of a 2 : 4-Diaminopyrimidine**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 29–33.

FALCO *et al.* [this *Bulletin*, 1951, v. 48, 872] showed that a series of 2 : 4-diaminopyrimidines possessed marked anti-malarial activity in *P. gallinaceum* infections of chicks, *P. berghei* of mice, *P. cathemerium* of canaries, and *P. cynomolgi* of monkeys. The present authors have tested one of the most active of these substances, BW. 50–63 or Daraprim, which is 2 : 4-diamino-5-*p*-chlorophenyl-6-ethylpyrimidine against *P. berghei* and *P. gallinaceum*, and in addition *P. relictum* of canaries. The results obtained were in good agreement with those of the original authors. In all the infections the drug was much more active than mepacrine or chloroquine. Limited tests on patients undergoing malaria therapy indicated that a dose of 100 mgm. Daraprim daily was well tolerated but the drug was apparently ineffective against the gametocytes of *P. falciparum*.

[The scanty results of the present authors obtained in human malaria are of little significance compared with those reported by MCGREGOR & SMITH, p. 663 and p. 664, by GOODWIN.] *J. D. Fulton*

COGGESHALL, L. T. **The Treatment of Malaria.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 124–31. [24 refs.]

A general review of the subject.

GUNTHER, C. E. M., FRASER, N. M. & WRIGHT, W. G. **Proguanil and Malaria among Non-Tolerant New Guinea Natives.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Mar., v. 46, No. 2, 185–90.

In a previous paper [this *Bulletin*, 1951, v. 48, 523] the senior author expressed the view that proguanil was a satisfactory suppressant of the malaria parasites prevalent in New Guinea. Subsequent events have led to some modification of this opinion. In January 1950, 60 adult male natives of New Guinea, recruited from an area 6,000 feet above sea level and possessing no tolerance for malaria, were brought to Bulolo, a hyperendemic malarious locality in the Morobe District. In the following April, 40 more labourers from another 6,000-feet plateau were introduced. All were given 100 mgm. proguanil thrice weekly under the supervision of a white overseer or reliable native supervisor. In April one of the former group developed malarial fever ; in May there were two more cases and in July one of the second group went down. In May and June two white men who had certainly been taking 3 doses of proguanil per week and one other who had probably been taking it all had malarial attacks. In August the prophylactic dose for the indigenous people was increased to 100 mgm. per day, after which there was one more case in October, one in November and one in the first half of December. The whites remained on 3 doses per week and among them there were one break-through in August and one certain and one probable one in October. From mid-December they were put on daily doses ; in December there were two break-throughs and in January one.

The authors conclude that while proguanil was satisfactory for the first 3 years of its use, there has been a progressive breakdown in its efficiency during the succeeding 16 months. They consider the most probable explanation to be the development of proguanil-resistant strains of malaria parasite, probably due to the taking of the drug in inadequate amounts.

[The view put forward cannot be regarded as anything more than a surmise, until it has been confirmed by the results of a controlled experiment.] *G. Covell*

i. Rajendram, S. & Jayewickreme, S. H. **Malaria in Ceylon. Part I. The Control and Prevention of Epidemic Malaria by the Residual Spraying of Houses with D.D.T.** *Indian J. Malariology.* 1951, Mar., v. 5, No. 1, 1–73, 4 maps & 12 charts. [37 refs.]

ii. —— & ——. **Malaria in Ceylon. Part II. The Control of Endemic Malaria at Anuradhapura by the Residual Spraying of Houses with D.D.T.** *Indian J. Malariology.* 1951, Mar., v. 5, No. 1, 75–124, 1 map & 7 charts.

iii. Jones, T. W. T. **Malaria and the Ancient Cities of Ceylon.** *Indian J. Malariology.* 1951, Mar., v. 5, No. 1, 125–34.

iv. ——. **Deforestation and Epidemic Malaria in the Wet and Intermediate Zones of Ceylon.** *Indian J. Malariology.* 1951, Mar., v. 5, No. 1, 135–61, 3 maps. [15 refs.]

i. The epidemiology of malaria in Ceylon is curious. It seems almost certain that the island was non-malarious less than 1,000 years ago. Following disastrous invasions it became malarious, the population was reduced and its distribution radically changed. Modern studies have shown well defined highly endemic areas, and non-malarious areas, with an intermediate zone. These correspond to climatic areas but their boundaries are fluid and periodic fulminant epidemics occur in the intermediate zone. The general epidemiology has been fully described elsewhere by Briercliffe [this *Bulletin*, 1936, v. 33, 218], Gill [*ibid.*, 214, 682, 687], and Briercliffe *et al.* [*ibid.*, 679], and is here reviewed with detailed information on the anopheline fauna, vital statistics and malariometric indices. The vector is *Anopheles culicifacies*, a domestic mosquito apparently attracted more to man than to cattle, with a short flight range and commonly breeding in pools—the detailed characteristics of which are noted in the paper.

Malaria control can be considered in three periods. From 1905 to 1920 was a period of pioneer effort and original control of a more experimental than practical nature. The period 1921–1936 was marked by the establishment of a special research and advisory organization and by control measures particularly in the towns in the highly endemic areas. Contemporaneously the estates initiated their own control schemes and a considerable amount of work was carried out in a limited number of centres. The epidemic of 1934–35 showed that limitation of work to highly endemic areas was not feasible, and during the next period, 1937–1945, the function of the control organization was altered to include more general control work. A feature of this period was the collection of routine records of breeding from the epidemic area as a means of forecasting and forestalling another epidemic. Much originality was displayed in this work but epidemics could not be averted in 1939–40, 1943 and 1945–46.

In the following period, 1946-49, residual insecticides were employed in all areas where the spleen rates were over 10 per cent. and in areas liable to epidemics. The original insecticide was DDT in the form of a 5 per cent. solution in kerosene oil, at a dose of 120 mgm. per square foot, applied at intervals of 6 to 10 weeks by knapsack sprayers. This programme has since been modified by the substitution first of emulsions and later of suspensions of DDT, the progressive reduction of the dose to 50 mgm. per square foot, and the substitution of BHC at a dose of 10 to 11 mgm. gamma isomer per square foot in some areas.

The organization is described in sufficient but not excessive detail. The results are illustrated by a detailed account of happenings in one selected epidemic area and in one highly endemic area, and by tabulated data referring to these and other areas.

The Dedura Oya and the Maha Oya basins are near the centre of the epidemic area and have suffered from severe epidemics, with recent ones in 1934–35, 1939–40 and 1943–44. The weather conditions of 1947, 1948 and 1949 have been very adverse and there has been every reason to expect a severe epidemic, but instead there has been a very marked drop in the number of clinical cases recorded at dispensaries. The spleen rate has fallen from 26·6 to 2·4 per cent. and the parasite rate (normally low in epidemic areas) from 3·6 to 0·1 per cent. The search for breeding, which had been the previous method of forestalling epidemics, has been continued and although all anti-larval measures have been discontinued there has been a marked diminution in the number of *A. culicifacies* larvae, while the numbers of larvae of *A. varuna*, *A. hyrcanus* and *A. vagus*, which are not house-haunters, have tended to increase. The number of adults which has been collected has also shown a very marked decrease, none being captured in houses in nearly 2,000 hours' work in 1949, though a continued prevalence in cattle-baited traps was recorded.

It is concluded that in 1948 and again in 1950 climatic conditions were extremely likely to precipitate spring epidemics, but they have been completely controlled by residual insecticides. *A. culicifacies* in Ceylon seems to have succumbed more readily than *A. gambiae* in Africa and the mortality inflicted on it seems to have been sufficient to give a material reduction in breeding.

ii. The district of Anaradhapura has been selected as an example of a normally highly endemic area, and a comparable study is made of the epidemiology and the progress of control of malaria in it. One small village was left untreated in this area for comparison [drug prophylaxis has been substituted]. There has been a comparable decrease in the number of clinical cases recorded in the hospital, which has decreased to one-tenth. The spleen rate has declined from 70 to 3 per cent., and the parasite rate (always low as a result of common therapy) has dropped from 16·4 to 0·3 per cent. The death rate has declined from 37·0 to 12·1 per 1,000 and the infant mortality rate from 263 to 90 per 1,000 live births. *A. culicifacies* is no longer to be caught in houses though it remains extremely common in the untreated village. There has been no decrease in breeding comparable to that found in the epidemic zone. There is no doubt that there has been a drastic reduction of malaria verging on, if not reaching, elimination of transmission, but the prospects of anopheline eradication seem slight.

iii. Tyssul Jones gives an account of the history of Ceylon leading up to the zenith of its civilization which was characterized by the construction of irrigation systems on a scale which is still incomparable. This civilization was subject to many wars but the first truly destructive invasions were by the Cholan emperors from the South of India starting in A.D. 918. A feature of these invasions was the widespread destruction of irrigation systems. There may also have been climatic changes with a tendency towards reduction of rainfall setting in about the tenth century. The improved breeding conditions supplied by a deteriorated irrigation system with this increasing aridity, made conditions favourable for the breeding of *A. culicifacies* and so made the island highly malarious.

[The abstracter, with personal knowledge of Ceylon, has long been puzzled by this subject, thinking that the explanations are not quite adequate. The destruction of the irrigation canals may perhaps have been an effective method of killing the cattle population and thus turning a species of mosquito which is naturally

predominantly zoophilic into a necessarily man-biting one, and thereby greatly increasing the probabilities of transmission. Researches into the numbers of cattle kept at the height of the civilization and after its fall might throw some light on this puzzling subject.]

iv. In his second paper, Tyssul Jones reviews the epidemiology with special reference to the climatic zones and the breeding conditions which occur in them. He points out that deforestation consequent on the development of the plantation industries may have caused a more rapid decrease in river volume in dry weather than had previously occurred, and thereby facilitated formation of pools and the occurrence of epidemic malaria. The widespread planting which occurred particularly in the intermediate zone and the foothills in the early part of this century, may therefore have aggravated the tendency to epidemics in these places.

[The entire number constitutes a very important record of the epidemiology and control of malaria in Ceylon, which merits detailed study by all interested in these subjects anywhere in the world. The analysis of results is unusually objective and the records of mosquito catches subsequent to control are very informative. There are other data which the abstracter would like to have seen included. Information on the anthropophilic index of *A. culicifacies* in Ceylon would be of real value and an objective assay of the mortality inflicted by the insecticides, with the use of the method of window-trap catching, would have materially helped in the formulation of a future maintenance programme. This does not detract from the importance of the report, which is an outstanding record.] *G. Macdonald*

Wilkinson, P. R. **Effects of House Spraying on African Anophelines.** [Correspondence.] *Nature.* 1952, Mar. 8, 421–2.

[See also this *Bulletin*, 1951, v. 48, 1074]

Vargues, R. & Fabiani, G. L'inoculation intracardiaque de *Plasmodium berghei*. Technique et intérêt de la méthode. [**Technique and Value of Intracardiac Inoculation of** *Plasmodium berghei*] *C.R. Soc. Biol.* 1951, Oct., v. 145, Nos. 19/20, 1519–21.

In view of the large number of parasites required to produce within a short time a detectable infection of rats with *Plasmodium berghei*, the authors devised a method whereby the negative period can be considerably shortened.

For this purpose, a donor rat with a heavy infection (50 per cent. erythrocytes) is bled white and the blood is collected in a double volume of 2 per cent. citrate. With a syringe, carrying a needle 0·5 mm. in diameter and 2 cm. in length, from 0·5 to 1 cc. of the blood is injected into the heart, the point of insertion being juxtasternal, slightly above the xiphoid appendix. The results of the inoculation can be seen by examination of blood taken from the tail 3 minutes after inoculation. In a number of rats which were inoculated intracardially with 1 cc. of blood containing 1 milliard parasites (from a donor having 50 per cent. infected red blood corpuscles), the tail blood revealed 3 minutes later one parasite per 500 erythrocytes. This number gradually decreases, but from the 16th hour onwards young parasites produced by the donor's merozoites appear in the recipient's corpuscles, which are distinguished from those of the donor by their appearance. By the 24th hour, 1 per cent. of the recipient's cells are infected, and the infection continues to develop in the normal way. Post-mortem examination has shown that schizogony takes place in the inner organs, but there was no evidence of any exo-erythrocytic stages. The chief advantage of the method described is the elimination of a prepatent period in the infection.

C. A. Hoare

VARGUES, R. & FABIANI, G. La réinoculation intracardiaque de *Plasmodium berghei* chez des rats guéris d'une infection première. [**Intracardial Reinoculation of *Plasmodium berghei* in Rats Recovered from the Primary Infection**] *C.R. Soc. Biol.* 1951, Oct., v. 145, Nos. 19/20, 1521–3.

It is known that rats which have spontaneously recovered from an infection with *Plasmodium berghei* become refractory to reinoculation even with heavy doses (up to 5 million) of parasites. The authors describe attempts to overcome this resistance by massive inoculations by the intracardial route (as described in the preceding paper).

Two series of recovered rats were inoculated with 100–500 million parasitized red cells. Twenty-four hours later their blood revealed the presence of young parasites, which persisted for 2–4 days, after which they disappeared. Some of these hyperimmunized animals were reinoculated again, but no parasites were visible in them. It was thus shown that the primary infection rendered the rats refractory to new infections. *C. A. Hoare*

FABIANI, G. & VARGUES, R. L'inoculation intrapéritonéale massive de *Plasmodium berghei* chez le rat blanc. [**Massive Intraperitoneal Inoculation of *Plasmodium berghei* in White Rats**] *C.R. Soc. Biol.* 1951, Oct., v. 145, Nos. 19/20, 1523–5.

Since intraperitoneal inoculations of *Plasmodium berghei* are usually made with small doses of parasites, the infection does not become evident for several days. In order to reduce the negative period, the authors have used massive doses of parasites (several hundred million) for inoculation of rats.

After intraperitoneal inoculation of "clean" rats with 500–800 million parasitized erythrocytes, the donor cells (which are recognizable by their appearance) can be seen in the blood of the recipient 15 minutes to 1 hour later, but they disappear after 24 hours. However, from the 3rd hour onwards young parasites appear in the recipient's cells and gradually increase in numbers, reaching 2 per cent. in 24 hours, after which the infection runs a normal course.

Similar experiments were carried out with rats recovered from a primary infection and with hyperimmunized animals. In the former, small numbers of young parasites appeared in the blood after 3 hours, but the infection disappeared in 48 hours. In the latter group there was practically no development of a new generation of parasites.

From these observations it is concluded that (1) the entire parasitized red cells penetrate through the peritoneal membrane into the blood stream; (2) the negative period has been eliminated, since developing parasites can be recovered after 3 hours; (3) this method provides clues for assessing various degrees of acquired resistance in the host. *C. A. Hoare*

MERCADO, Teresa I. & COATNEY, G. R. **The Course of the Blood-induced *Plasmodium berghei* Infection in White Mice.** *J. Parasitology.* 1951, Oct., v. 37, No. 5, Sect. 1, 479–82, 1 fig. [11 refs.]

A description is given of the course of infection with *Plasmodium berghei* in white mice, each of which was inoculated intravenously with about 4,000 parasitized red cells. The incubation (prepatent) period varied from 3 to 6 days, the mean being about 4 days, after which parasitaemia gradually increased till the 5th day, when 34 per cent. of the erythrocytes were infected. Thenceforth the density of parasites remained at the same level till the end of the patent period, which varied from 4 to 19 days, with an average of about 10·34 days. The death rate was 100 per cent., the majority of animals dying 24 hours after the peak was reached.

An estimate was made of the number of merozoites produced by the parasite in the course of schizogony at different periods of the infection. On the 2nd day of patency each segmenter gave rise to from 3 to 16, with an average of about 8 merozoites, while at the terminal stage of the infection there were 12–14 merozoites with an average of about 12·8. The infection brings about anaemia, the numbers of erythrocytes falling from 9,820,000 (normal) to 1,170,000 per cmm. shortly before death. *C. A. Hoare*

Zuckerman, A. & Yoeli, M. **The Effect of Splenectomy on the Course of *Plasmodium berghei* Infections in *Microtus guentheri*.** *J. Infect. Dis.* 1951, Sept.–Oct., v. 89, No. 2, 130–42, 3 figs. [17 refs.]

The authors describe the course of untreated infection of laboratory-bred Palestinian field voles, *Microtus guentheri*, with *Plasmodium berghei*, as well as the effects of splenectomy on such infections. Each vole was inoculated intraperitoneally with 40,000,000 parasitized erythrocytes from infected rats, and the course of the infection was followed in stained blood films.

There was a short incubation (prepatent) period, usually not exceeding 48 hours, followed by a patent period of about a fortnight, after which the infection became latent, with occasional short relapses. The infections were generally of a benign character, the mortality rate being 22 per cent. Parasitaemia is typically low, with a mean peak count of 10 per cent. in cases where the infection became latent, and 50 per cent. in fatal cases, though in a few cases parasitaemia reached 70 per cent. From the 4th week onwards, the voles which survived underwent spontaneous cure.

The defence mechanism of voles is inhibited by splenectomy. When the operation was performed before or during the first fortnight after inoculation, the animals died with parasitaemia of about 40 per cent. Splenectomy during the 3rd and 4th weeks resulted either in death or in a prolonged chronic infection ; but on some occasions there was no relapse and the animals recovered, as shown by the failure to subinoculate susceptible hosts with their tissues.

It is concluded that the spleen plays an essential rôle in establishing immunity against *P. berghei* and in promoting the recovery of voles from the infection : the removal of this organ has an adverse effect both on the natural and acquired defence mechanisms of the host. *C. A. Hoare*

Fabiani, G., Izzo, M. A. & Grellet, P. Réveil par la surrénalectomie d'infections sanguines latentes (à hématozoaires et à bartonelles) chez le rat blanc. [**Activation by Suprarenalectomy of Latent Blood Infections (with *Plasmodium* and *Bartonella*) in the White Rat**] *C.R. Soc. Biol.* 1951, Sept., v. 145, Nos. 17/18, 1301–2.

In view of the part played by the suprarenal glands in the mechanism of immunity, the authors studied their effect in experimental infections of rats with *Plasmodium berghei*, with special reference to the effect of the removal of these glands upon latent infections. Similar experiments were carried out on bartonellosis in rats. Suprarenalectomy was also combined with splenectomy.

Bilateral suprarenalectomy was performed on five rats recovered from an infection with *P. berghei*. Of three animals, which were not injected with desoxycorticosterone acetate, only one showed plasmodia after 48 hours. Although the operation had activated the infection, the effect is not constant and it failed to reveal *Bartonella*. In two rats, which were given daily injections of 0·5 mgm. desoxycorticosterone acetate, the operation failed to activate either the plasmodia or bartonella, but splenectomy performed on one of these rats

activated the malaria infection 8 days later. In another experiment, five rats, of which two had recovered from a malaria infection, were first splenectomized and then suprarenalectomized. In the two animals malaria was activated after splenectomy, and again after suprarenalectomy, while in one of them bartonellas also reappeared. The remaining three rats had previously recovered from bartonellosis : in two of them suprarenalectomy activated the infection.

It is concluded that suprarenalectomy rarely activates a latent infection with *Plasmodium* and *Bartonella* when the spleen is intact, but this effect can be more readily produced if this operation is preceded by splenectomy.

C. A. Hoare

FINDLAY, G. M. & HOWARD, E. M. **Cortisone and *Plasmodium berghei* Infection in Mice.** [Correspondence.] *Nature.* 1952, Mar. 29, 547.

There are now considerable data from laboratory and clinic indicating that cortisone increases the intensity of certain bacterial and viral infections. The present authors have now investigated the effect of the drug when given to mice infected with *P. berghei*. Two groups of 12 mice of 20 gm. weight, in separate experiments, were injected intramuscularly with 5 mgm. of cortisone acetate, a dose which was known to be tolerated, and 30 minutes later were injected subcutaneously with 0·1 ml. of infected mouse blood. A similar number of controls received the infected blood only. When the dosage of cortisone was given to the experimental animals 6 hours and again 4 days later, the control animals received only saline by the same route. The course of infection in each group of animals was followed in blood smears each morning and evening till death supervened. Parasites appeared earlier in the peripheral blood of drug-treated animals than in that of controls and the intensity of infection in the former was increased. Death also occurred earlier in those receiving drug at an average interval of 5 days after inoculation as opposed to 9·5 days in controls. The smaller size of the spleen in drug-treated animals suggested that the cellular response to infection was inhibited by cortisone. Similar results were obtained with toxoplasm infections of mice. Although the results in malaria-infected mice may not be applicable to man, it is suggested that care should be exercised in the treatment of malarial patients with cortisone.

J. D. Fulton

REDMOND, W. B. **Influence of Cortisone on Natural Course of Malaria in the Pigeon.** *Proc. Soc. Exper. Biol. & Med.* 1952, Feb., v. 79, No. 2, 258–61, 3 figs. [13 refs.]

As noted in the preceding abstract cortisone affects adversely many types of clinical and experimental infections. In this investigation its influence on the host-parasite relationship has been studied in pigeons infected with *P. relictum*. The hosts were treated intramuscularly with 5 mgm. daily doses of cortisone acetate over a period starting either 1 to 3 days before inoculation, after the crisis or towards the end of the infection. The course of the infection was followed by daily examination of stained blood films. In 11 pigeons treated before inoculation with parasites, 3 showed a higher initial peak of infection than controls, while in the remainder the peak of parasitaemia was within the normal range, and occurred at approximately the same time in treated and control birds. The fall in the number of parasites in the first few days after the crisis was similar in both groups. In the treated birds, however, it was followed by a steep rise in parasite numbers and death frequently resulted whereas in untreated birds survival in absence of detectable parasites was the rule. When treatment

with cortisone was begun 2 to 3 days after the peak of parasitaemia a rise in parasite numbers again resulted and death generally followed. Paludrine [proguanil] was administered in minimal effective doses to 3 cortisone-treated birds and controlled the infection thus suggesting that cortisone did not directly affect the parasites but possibly interfered in some way with the production of immunity. When, however, the immune reaction was operative during a period of latency, cortisone was no longer effective and failed to produce relapse. The effect of the drug on humoral and cellular factors in immunity to malaria is being studied. *J. D. Fulton*

Bishop, Ann & McConnachie, Elspeth W. **Failure to produce Resistance to Chloroquine in *Plasmodium gallinaceum* in Chicks.** *Parasitology.* 1952, Mar., v. 42, Nos. 1/2, 52–6. [22 refs.]

A number of authors have prepared strains of malaria parasites resistant to certain drugs in monkeys, birds and man. The present authors have attempted without success to make a strain of *P. gallinaceum* resistant to chloroquine under the same conditions in which strains of this parasite have been rendered resistant to other drugs [this *Bulletin*, 1947, v. 44, 969, 970] by giving sub-effective doses of drug while passage from host to host was carried out every few days by blood inoculation. The doses used in this case were 0·04, 0·08, 0·16, and 0·2 mgm. daily per 20 gm. chick. In some cases passage alternated in treated and untreated birds. During a period of 16 months in which 89 passages were made no significant resistance developed and the reactions of the strain to quinine and atebrin [mepacrine] were unaltered. *J. D. Fulton*

Bishop, Ann & McConnachie, Elspeth W. **Pamaquin Resistance in a Strain of *Plasmodium gallinaceum* and its Relationship to Other Antimalarial Drugs.** *Parasitology.* 1952, Mar., v. 42, Nos. 1/2, 57–64. [36 refs.]

In preparing a strain of *P. gallinaceum* resistant to plasmoquine [pamaquin] an oral dose of 0·01 mgm. per 20 gm. bird daily was gradually doubled till a dosage of 0·08 mgm. was reached. After 5 months' treatment with this dose the parasites were not affected, indicating that some resistance had developed. The dose of 0·08 given twice daily did, however, affect the parasites and passage in untreated birds became necessary to maintain the infection. Finally a dose of 0·16 mgm./20 gm. twice daily could be given. This dose suppressed growth of gametocytes but they subsequently appeared in normal numbers in untreated hosts indicating that resistance had occurred preferentially in the asexual forms. Studies were made of cross resistance to other drugs as similarities in mode of action may be detected in this way. The following is the authors' summary:—

"1. A four- to eight-fold increase in resistance to pamaquin has been developed in a strain of *Plasmodium gallinaceum* in chicks.

"2. Pamaquin resistance conferred no resistance to proguanil, sulphadiazine, mepacrine, chloroquine or sontochin, but it conferred some resistance to pentaquine and to quinine.

"3. An appreciable loss of resistance to pamaquin was observed in the pamaquin-resistant strain after it had been maintained in the absence of the drug, in a patent state of infection, for a period of 6 months.

"4. No synergism was observed between pamaquin and quinine when these drugs were tested, in combined doses, upon active infections of *P. gallinaceum*."

J. D. Fulton

Taylor, D. Jane, Josephson, E. S., Greenberg, J. & Coatney, G. R. **The *in Vitro* Activity of certain Antimalarials against Erythrocytic Forms of *Plasmodium gallinaceum*.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 132–9. [29 refs.]

The authors [this *Bulletin*, 1951, v. 48, 873] have previously described a method for testing *in vitro* the action of chemical agents on *P. gallinaceum* and have now compared the results obtained with those for a wide range of known antimalarials *in vivo*. Pamaquin [plasmoquine] and its metabolites and chlorguanide [proguanil] and its metabolites were among those tested. The method of test was briefly as follows : 5×10^8 parasitized chicken red cells were rocked in chick-blood medium at 37°C. for 24 hours in presence of the desired concentration of drug, which was absent in control experiments. The minimum effective dose was that which prevented development of 90 per cent. of the parasites when subinoculated to young chicks as reflected by increase in length of the prepatent period. The method of estimating the concentration of the various drugs is indicated in references. The results fell broadly into two classes : (1) where activity was exhibited *in vitro* at a concentration approximately that in the host blood during successful treatment *in vivo*, probably indicating that no degradation had taken place, and (2) in which the *in vitro* activity was much less than that for a similar concentration *in vivo*, suggesting that an active metabolite was formed in this case. In partial explanation of the results obtained it should be noted that under the cultural conditions employed the parasites reached only an early schizont stage and did not multiply, whereas it is known that some anti-malarials act only on certain stages of the parasite. The drugs which acted at similar concentrations *in vitro* and *in vivo* were chloroquine, quinacrine [mepacrine], quinine and a naphthoquinone. Pamaquin, which is known to give rise to active metabolites *in vivo*, showed little activity *in vitro*. The remainder of the substances tested, including sulphonamides, chlorguanide and two of its metabolic products, some 2 : 4-diaminopyrimidines and a 2 : 4-diaminopterin, showed little *in vitro* activity. *J. D. Fulton*

Jaswant Singh, Nair, C. P. & David, A. **Five Years' Observation on the Incidence of Blood Protozoa in House Sparrows (*Passer domesticus* Linnaeus) and in Pigeons (*Columba livia* Gmelin) in Delhi.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 229–33.

"The blood of 869 house sparrows (*Passer domesticus* Linnaeus) and 214 domestic pigeons (*Columba livia* Gmelin) of Delhi were examined between 1946 and 1950. *P. relictum* was found in 29·5 per cent and haemoproteus gametocytes in 7·1 per cent of the sparrows examined. The only protozoa found in pigeons was *Haemoproteus columbae* and the same was found in 21·5 per cent of the birds examined. The incidence of both plasmodial and haemoproteus infections in the birds was the minimum during the summer season. Mosquito feeding experiments on sparrows with *P. relictum* gave a result of 87·3 per cent sporozoite infection in *C. fatigans*. *C. lutzia* was found susceptible to *P. relictum* but *A. subpictus* was refractory to this infection."

Garnham, P. C. C. **An Attempt to find the Vector of *Hepatocystis* (=*Plasmodium*) *kochi* (Levaditi and Schoen).** *Exper. Parasit.* New York. 1951, Oct., v. 1, No. 1, 94–107, 1 fig. [30 refs.]

The author describes his attempts to find the intermediate host of *Hepatocystis kochi*, the malaria parasite of African monkeys which belongs to the family

Haemoproteidae. Since other members of this group (*Haemoproteus* and *Leucocytozoon*) are not transmitted by mosquitoes, the vector was sought for among a variety of Arthropods, in the field and in the laboratory. In the course of this investigation large numbers of mosquitoes, collected near Nairobi and including species of *Anopheles*, *Aëdes* and *Culex*, were dissected, but sporozoites could not be found in their salivary glands, though infected monkeys were numerous in the district. Lice (*Polyplax serrata*) collected on monkeys were examined by dissection and a saline suspension of their teased-up bodies was inoculated into a clean monkey, but no parasites were discovered. Various arthropods (*Culicoides*, *Rhodnius*, *Glossina*, mosquitoes and mites) were fed on infected monkeys and, after periods up to a fortnight, were dissected and examined for the presence of parasites, again with negative results. In order to restrict the search of likely vectors in an endemic area, 3 heavily infected monkeys were anaesthetized and exposed to the bites of arthropods in the forest. Both the arthropods which had fed spontaneously and those which had been captured and induced to feed on the monkeys were collected in tubes and kept alive for a month or longer, after which they were dissected and examined for the presence of developmental stages of the parasite. No oökinetes or only a few were found in *Taeniorhynchus*, *Hodgesia*, *Stomoxys* and *Chrysops*, but numerous oökinetes developed in many species of mosquitoes and in sandflies. However, in none of the fed insects which were kept longer were any later stages of development of the parasite seen. The stages observed in the course of this study (gametocytes—zygotes—oökinetes) are described in detail and illustrated.

Although the method of transmission of this parasite has not been discovered, the available data indicate that mosquitoes are not the vectors, and it is suggested that these might be sought among the smaller Diptera, *e.g.*, sandflies and midges. *C. A. Hoare*

TRYPANOSOMIASIS

TANGANYIKA. **Annual Report of the Tsetse Survey and Reclamation Department consolidated up to and including 1949.** 20 pp., 12 folding maps (1 coloured). 1951. Dar es Salaam : Govt. Printer.

The report covers 39 different schemes for the control of tsetse fly by bush-clearing in Tanganyika. The original reasons for initiating the schemes are given and, usually, the progress of the work since it was begun is outlined ; notes are given on the extent of the ground to be cleared (either by sheer or discriminative clearing), the estimated costs, and the labour and funds available for the work. The report includes in a folder 11 sketch-maps, each covering usually several related schemes, and a coloured map of Tanganyika Territory, showing the distribution of tsetse species in the territory (up to December 1947).

With the assistance of these maps, the reader can obtain a good conception of the extent of the problems which have been faced, and often surmounted, throughout the territory since tsetse control was first undertaken by the original Tsetse Research Department, and continued, after 1946, by the newly organized Tsetse Survey and Reclamation Department. The report gives the results obtained up to and including 1949. Some of the schemes have made good progress or have been completed ; others have not developed satisfactorily, largely because of difficulties in obtaining sufficient labour.

The schemes include clearings to prevent further extensions of established belts of *Glossina morsitans*, protective clearing to safeguard important townships, grazing grounds, and dairy and experimental farms, or major roadways. Other schemes were planned to reclaim territory lost to the fly or for the resettlement

of tribes whose lands were overpopulated and eroded. In certain instances, barrier clearings were urgently undertaken to limit the spread of epidemic human trypanosomiasis due to *Trypanosoma rhodesiense.*

The schemes are presented by provinces as follows, the number in each province being indicated in brackets : Southern Highland Province (4) ; Central Province (11) ; Northern Province (11) ; Western Province (4) ; Lake Province (4) ; Eastern Province (3) ; Tanga Province (1) ; Southern Province (1).

The reports of the work done in the Central and Northern Provinces form an interesting account of the progressive development of separate schemes providing finally in their entirety a complete protection of the Great North Road from invasion by *G. morsitans* throughout its whole traverse from north to south through the territory. A number of the schemes involving the risks of dispersal of fly by road transport required the establishment of fly pickets and cleansing chambers. A list of these is given indicating their location on the roads.

The species of *Glossina* concerned in the different schemes are recorded.

D. S. Bertram

Mossop, M. C. **Report of the Division of Entomology for the Year ending 31st December, 1947.** *Rhodesia Agric. J.* 1948, May–June, v. 45, No. 3, 230–48 ; also as *Bull. Minist. Agric.* [*S. Rhod.*] 1948, No. 1445, 20 pp.

Whellan, J. A. **A Review of the Tsetse Fly Situation in S. Rhodesia, 1948.** *Rhodesia Agric. J.* 1949, Sept.–Oct., v. 46, No. 5, 316–25 ; also as *Bull. Minist. Agric.* [*S. Rhod.*] 1949, No. 1489, 11 pp.

——. **Tsetse Fly in S. Rhodesia, 1949.** *Rhodesia Agric. J.* 1950, Sept.–Oct., v. 47, No. 5, 416–27, 1 folding map ; also as *Bull. Minist. Agric.* [*S. Rhod.*] 1950, No. 1547, 13 pp., 1 folding map. [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Feb., v. 40, Pt. 2, 23–4.]

In the third of these reports, a very brief historical review is given of *Glossina* infestation in Southern Rhodesia, and the areas infested in 1850–90, in 1930 and in 1949 are shown on a map. Apart from this, the second and third reports and the section of the first dealing with *Glossina* follow the same lines as the previous ones. There were ten cases of sleeping sickness in the Colony in 1947, nine in 1948 and three in 1949, as compared with 13 in 1946. Satisfactory progress against *Glossina morsitans* Westw. continued in all northern areas in 1947 and 1948. The situation was confused in 1949 by an exceptionally severe drought during which many sources of water previously considered permanent dried up and game (principally elephant) consequently wandered much further than usual and spread the fly. However, the position reverted to normal with the return of the rains. The barrier belt of controlled game destruction, which has enabled 10,000 sq. miles to be reclaimed, has not been advanced since 1940. The numbers of cattle in the Sebungwe District rose steadily, and trypanosomiasis did not occur among them except for three cases in 1948 and six in 1949 in a locality very near established fly where, until 1947, there had probably been no cattle since 1913. The occurrence of *G. pallidipes* Aust. at Chenga on the Nagupande River, discovered in 1942, was verified in December 1949. This fly is also known to be present near the junction of the Sebungwe and Maseme Rivers. *G. morsitans* was not seen in the Hartley area during 1948 or 1949. Cattle were introduced into the Sanyati Native Reserve in the former year, and no trypanosomiasis had been reported in 1949. In the Urungwe District, *G. morsitans* was fairly dense in the Zambesi valley

north of the escarpment in all three years. The number of cattle in the Urungwe Native Reserve increased from year to year, and no trypanosomiasis was noted in them.

Eight cases of trypanosomiasis in cattle were seen in Mtoko in 1947. There was a serious outbreak with more than 100 deaths in 1948, but no major outbreak occurred in 1949 and only 21 deaths were recorded. No fly was seen in 1947, but *G. morsitans* was located in Portuguese East Africa about 20 miles from the Mkota Reserve in 1948, and it is concluded it had been carried to the Reserve by elephants and spread the disease. Limited shooting of elephants was accordingly permitted, and the situation improved. The control of elephants continued in 1949.

In the Chipinga area of the Eastern Border, the number of cases of trypanosomiasis of cattle continued to decrease in 1947, but rose in 1948 to 96 cases on nine farms, the highest since 1945. In 1949, the number of cases was 87, but the number of farms involved had increased to 19. Flies caught in Portuguese East Africa on or near the border comprised 96, 83 and 48 examples of *G. pallidipes* in the three years, respectively, 12, 1 and 24 of *G. brevipalpis* Newst. and 16, 20 and 6 of *G. morsitans*. On the Rhodesian side of the border, five examples of *G. pallidipes* and one of *G. brevipalpis* were taken in 1947, four of *G. pallidipes*, one of *G. brevipalpis*, and two of *G. morsitans* in 1948 and two of *G. pallidipes* and two of *G. brevipalpis* in 1949. The main clearing was widened in places in the first two years, and the increasing ease of maintaining it made possible the clearing of a new area of over 3,000 acres in 1949. Further south in the Sabi Valley, there was no improvement in 1947 or 1948. The concentration of *G. morsitans* in Portuguese East Africa near the border was still heavy, and a survey in 1949 indicated that it would not be safe to reintroduce cattle in certain areas where it had been hoped to do so. In Ndanga district, shooting was resumed in 1947, following the finding of two cases of trypanosomiasis in stock.

Steyn, J. J. **DDT Field Trials against Tsetse Fly** (*G. palpalis*) **on Nkuzi Island, Lake Victoria.** *J. Entom. Soc. Southern Africa.* 1949, v. 12, 126–9. [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Feb., v. 40, Pt. 2, 24–5.]

Field trials with DDT against *Glossina palpalis* (R.-D.) in Uganda were carried out in 1945 on a small uninhabited island, 4·65 acres in extent, in Lake Victoria. There were several breeding places along the edge of the island, but a dust impregnated with 4 per cent. DDT applied to these from an aeroplane on 14th February had no effect on the fly, though conditions were very favourable and the dust was effectively deposited. Subsequent tests were made with a solution of 5 per cent. DDT (74 per cent. p,p′isomer) in a mixture of kerosene and cottonseed oil (1 : 3), as previous experiments had indicated that the deposit from this solution is more persistent on foliage than those from other formulations. It was first applied to an area of one acre at the end of May, and subsequent catches indicated some reduction in the numbers of the fly, but it was concluded that thorough treatment of the feeding grounds would be necessary for effective control. On 29th July, therefore, the solution was applied exclusively to the feeding grounds, especially rocks frequented by crocodiles ; only 3 per cent. of the island had to be treated but a total of 23 lb. DDT was applied. Control was immediate and complete ; no tsetses were seen on the island from the day after treatment up to 17th December, when observations were discontinued, though crocodiles, giant monitor lizards, hippopotamus and cormorants were present as usual. The insect population in general was not adversely affected.

MONTESTRUC, E. Le syndrome ganglionnaire chez l'européen atteint de trypanosomiase. [**Adenitis in Europeans Suffering from Trypanosomiasis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 48–51.

It was observed by KOERBER [this *Bulletin*, 1951, v. 48, 793] that adenitis was not a feature of the disease in 5 European patients suffering from trypanosomiasis (*T. gambiense*) in the Dakar area, and he concluded that gland puncture is therefore less reliable as a diagnostic measure in Europeans than in Africans. In rebuttal of this Montestruc describes 2 Europeans in whom adenitis was prominent, and insists that it would be unwise to dismiss trypanosomiasis as the diagnosis when adenitis is found in a European who may have been exposed to infection. In the first patient adenitis occurred at an early stage of the disease, and many trypanosomes were found in the gland juice. In the second patient adenitis occurred within 24 hours of the onset of fever. No trypanosomes were found in the blood a day later but many were found on the next day. Gland puncture was not done because the glands were very painful. In this case adenitis occurred at least 72 hours before trypanosomes were found in the blood. There was a rapid subsidence of the glands after the administration of moranyl. Professor A. SICÉ adds a note confirming that adenitis is an early feature of trypanosome infection. *H. G. Calwell*

PELLEGRINO, J., BORROTCHIN, M., LEITE, G. & BRENER, Z. Inquérito sôbre a doenca de Chagas em candidatos a doadores de sangue. [**Survey on the Incidence of Chagas' Disease among Prospective Blood Donors**] *Mem. Inst. Oswaldo Cruz.* 1951, Mar., v. 49, 555–64, 3 figs. [21 refs.] English summary.

Though short, this paper is an important contribution to conditions in places where Chagas's disease is endemic. Since November, 1948, 576 persons have volunteered as blood donors to a hospital in Belo Horizonte, in the Province of Minas Gerais, Brazil. They were of all ages between 16 and over 40, of white, black and coloured races, of either sex and of practically all occupations. Complement fixation, with the use of cultures of *T. cruzi*, was carried out and 14 tests gave a definite positive result ; 6 others were doubtful. In 7 persons, radiography of the heart was made and electrocardiograms taken and they [in one place the number is given as 6, but in the authors' summary 7] were subjected to xenodiagnosis with laboratory-bred nymphs of *Triatoma infestans*. These 7 had lived in endemic districts of the province and in houses infested by Triatomidae and 6 of them owned to having been bitten by the bugs. Three of the 7 with positive complement fixation gave a positive result to xenodiagnosis. Three also showed myocardial lesions, 2 with right bundle branch block and one with complete A-V block. The authors stress the importance of special care in selecting blood donors and of carrying out the c.f. test for *T. cruzi* where there is any possibility of infection, cryptic or patent. *H. Harold Scott*

RAMSAY, J. A. **The Excretion of Sodium and Potassium by the Malpighian Tubules of *Rhodnius*.** *J. Exper. Biol.* 1952, Mar., v. 29, No. 1, 110–26, 4 figs. [12 refs.]

LEISHMANIASIS

Oberling, C. & Ansari, N. Culture de *Leishmania tropica* sur la membrane chorio-allantoïde du poulet. [**Cultivation of *Leishmania tropica* on the Chorio-Allantoic Membrane of Chick Embryos**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 542–5.

A description is given of the cultivation of *Leishmania tropica* on the chorio-allantoic membrane of chick embryos, inoculated with N.N.N. cultures by various methods and incubated at different temperatures. It was found that neither the technique used nor the age of the embryos had any influence upon the growth of the flagellates, which differed only according to the temperature at which the eggs were kept after inoculation.

Since at 25°C. the embryo ceases to develop and dies within 24 hours, there can be no question of growth *in vivo* but the leptomonads behave as they do in cultures *in vitro*, invading all the embryonic cavities. At 31–32° the embryo continues to develop and growth of the leptomonads is restricted to the chorio-allantoic membrane. At 35° the flagellates are also present in large numbers on the membrane, but the examination of smears reveals phagocytosis of the leptomonads by macrophages. At 38·5–40° the flagellates can be found on the membrane 24 hours after inoculation, but their number gradually decreases until, after 72 hours, they disappear completely. After 4 days no free flagellates can be found in direct smears or in sections, but the macrophages are invariably filled with leishmaniasis, and the histological picture reproduces that seen in cutaneous leishmaniasis. *C. A. Hoare*

FEVERS OF THE TYPHUS GROUP

Drysdale, A. D. & Kirk, R. **Typhus Fevers in the Anglo-Egyptian Sudan, II.** *J. Trop. Med. & Hyg.* 1952, Mar., v. 55, No. 3, 49–50.

The interest of these cases lies in the rarity of fevers of the typhus group in the Sudan where an enquiry by the authors in 1949 elicited evidence of the occurrence of one case of tick typhus and of a problem case with a *Proteus OXK* type of reaction but of no other cases of "zootic" typhus. [See this *Bulletin*, 1949, v. 46, 1021.]

The cases now described occurred in October, 1950, in the Gezira area and both patients became infected in the same compound though they lived in different houses, and a thorough investigation failed to show that any other cases had occurred among contacts with either patient. The patient whose illness was observed had a rising-titre Weil-Felix reaction ; the titre against *Proteus OX19* rose to 1–1,250 on the 8th day, and against *P. OX2* to 1–125. There was a macular rash which became petechial or haemorrhagic and was most prominent on the forearms and lower limbs. After 8 days of fever the temperature declined "by lysis in the following ten days or so". The other patient was seen while convalescing from a sharp febrile illness ; her serum gave a reaction with *P. OX19* at 1–500. No evidence of infection was found among 46 rats and other rodents trapped in the locality ; guineapigs inoculated with brains of the rats showed no reaction and sera of the guineapigs killed, after 14 days, gave completely negative results when tested by Dr. J. H. S. Gear for complement-fixing antibodies against *Rickettsia prowazeki*, *R. mooseri* and *R. rickettsi*.

Dr. Gear suggested that complement-fixation tests of the patients' sera might be helpful ; but circumstances prevented the performance of the test till 6 months later and the only serum found suitable gave negative reactions with the above strains of rickettsiae. [The authors assume that the Weil-Felix reaction of the *OX19* type and the absence of an eschar in both cases exclude a diagnosis of tick typhus ; this assumption is often made but it does not seem to be based on reliable evidence.] *John W. D. Megaw*

Giroud, P. & Gaillard, J. A. L'extinction de l'infection typhique exanthématique sur pou en dehors de toute action prophylactique. [**The Disappearance of Typhus Infection from Lice in the Absence of Prophylactic Measures**] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 1/2, 6–8.

A strain of *Rickettsia prowazeki* was recovered by guineapig inoculation from a patient who had a recurrence of typhus fever 23 years after the original attack in Poland. Passages of the strain were made through lice by intrarectal inoculation according to the technique of Weigl. In the first passage 25 of 42 inoculated lice became infected by the 8th to the 10th day ; 10 of the lice died between the 1st and 9th day. In the 3rd passage, 86 per cent. of the lice became positive on the 3rd day. In the later passages fewer and fewer lice became infected and the incubation period was very irregular. Faeces of the inoculated lice which were rich in rickettsiae caused the death of numbers of the next group of lice within 2–3 days and by the 8th passage lice that survived inoculation remained uninfected. The strain could, however, be recovered from the intestines of lice that died early after inoculation and it then behaved in the same way it had done on the first passage.

The extinction of the strain was thought to have been due to the development of a lytic agent and the authors suggest that just as late-relapsing cases are the sources of fresh epidemics so also these epidemics are brought to an end by a natural process in which the lice are killed by toxins liberated by the lysis of the rickettsiae.

[It may be argued that the highly artificial conditions of the experiment are quite different from those obtaining in natural transmission.]

John W. D. Megaw

Kryński, S., Kuchta, A. & Becla, E. Badania nad zagadnieniem żywienia wszy poza człowiekiem. Próby karmienia na śwince morskiej. [**The Study of Lice Feeding on Guineapigs**] *Med. Dośw. i Mikrob.* Warsaw. 1952, v. 4, No. 1, 13–24. [22 refs.]

The English summary appended to the paper is as follows :—

" The authors tried to find out the mechanism of toxic action of guinea pigs blood on lice. Contrary to Cabasso's statement blood cells of the guinea pig are rapidly hemolysed, much more so than human blood cells. Hemoglobin set free crystallizes in the form of trigonal pyramids which injure mechanically intestinal epithelium of the lice with their sharp angles. Supplementary feeding of lice on humans 2 hours after they were fed on guinea pigs is of not much help. The diminution of the percentage of loss of lice has been due to greater dilution of their intestinal content and to elimination of guinea pigs blood cells when fed on humans. Human blood or serum alone do not prevent the formation of crystals with guinea pig blood. Some improvement may be made by shortening the time of starvation of lice before they are fed on guinea pigs. The age of lice has some significance. Young adult individuals stand better feeding on guinea pig blood. The old ones and especially the larvae newly hatched out die very rapidly. There is no difference in the toxicity of blood of different or

differently fed guinea pigs. Hemoglobin of guinea pigs crystallizes in the same way in the intestines of bedbugs and ticks but due to slow intestinal peristaltic movements their intestines are not injured and hemoglobin crystals of guinea pig blood cells are digested in a few days. Lice suck willingly guinea pig blood but it cannot be used for feeding them. The results of Cabasso with supplementary feeding of lice on humans were not confirmed by authors' experience. Infecting lice by feeding them on guinea pigs infected with typhus fever for purpose of preparation of lice antityphus vaccine is not promising in authors' opinion because of great loss of lice fed on guinea pigs, much greater than that when Weigl's method is used."

Murray, E. S., Cohen, S., Jampol, J., Ofstrock, A. & Snyder, J. C. **Epidemic-Typhus Antibodies in Human Subjects in Boston, Massachusetts.** *New England J. of Med.* 1952, Mar. 6, v. 246, No. 10, 355–9. [14 refs.]

Among 272 residents of Boston who were born in typhus zones of Europe, 51 were found to have complement-fixing and mouse-neutralizing antibodies of louse-borne typhus. In one group comprising 50 of the 272 persons, 20 were found to have antibodies detectable by a modified complement-fixation test. Among 247 persons born in the U.S.A. or Canada, none gave a positive response to the tests.

Complement-fixation titres of 1–80 to 1–160 were observed in 11 of the foreign-born persons ; the explanation of these high titres was not obvious ; unrecognized attacks of Brill's disease may have occurred recently. Only 5 of 31 reactors who were specially questioned could remember having an attack which might have been typhus fever. The average age of the reactors was 69·5 years ; 48 of them were born in Russia. Their average period of residence in the U.S.A. was 40–50 years. *John W. D. Megaw*

Kodlin, D. Zur Statistik der postvakzinalen Immunität beim natürlichen Fleckfieber. [**Statistics of Immunity after Vaccination against Typhus**] *Ztschr. f. Hyg. u. Infektionskr.* 1952, Jan. 2, v. 133, No. 5, 483–8. [14 refs.]

The author discusses 10 previously published reports on the efficacy of immunization against epidemic typhus. The value of some of these is doubtful, as a control group of non-immunized subjects is either missing or in some way not comparable with the immunized group. Of the 4 remaining investigations, two show a significant improvement in morbidity, and the other 2 show a significant effect on case-mortality (proportion of deaths to cases) and severity of the illness, but not on morbidity. It is suggested that immunization may be less effective in reducing morbidity when the natural morbidity rate is high. [None of the investigations reported here was strictly controlled, with random allocation of subjects to the immunized and control groups. In the absence of random allocation the comparability of the two groups in all relevant respects remains in doubt.] *P. Armitage*

Wisseman, C. L., Jr., Hahn, F. E., Jackson, Elizabeth B., Bozeman, F. Marilyn & Smadel, J. E. **Metabolic Studies of Rickettsiae. II. Studies on the Pathway of Glutamate Oxidation by Purified Suspensions of *Rickettsia mooseri*.** *J. Immunology.* 1952, Mar., v. 68, No. 3, 251–64, 4 figs. [41 refs.]

[See also this *Bulletin*, 1950, v. 47, 832, 970.]

" The oxidation of glutamic acid by purified suspensions of *Rickettsia mooseri* has been traced through a series of reactions involving α-ketoglutaric, succinic, fumaric, malic, oxalacetic, and pyruvic acids as intermediate steps. No

evidence has been obtained for the participation of any of the tricarboxylic acids in this process, though such participation cannot be excluded with certainty at the present time."

SMADEL, J. E., LEY, H. L., Jr., DIERCKS, F. H., PATERSON, P. Y., WISSEMAN, C. L., Jr. & TRAUB, R. **Immunization against Scrub Typhus : Duration of Immunity in Volunteers following Combined Living Vaccine and Chemoprophylaxis.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 87–99. [15 refs.]

Several strains of lyophilized living yolk-sac cultures of *Rickettsia tsutsugamushi* were used in this study after being titrated for infectivity and lethality to mice. Volunteers were inoculated intradermally with suitable doses of these vaccines.

Eight volunteers were inoculated with a Karp strain of rickettsia and given a course of 3–4 weeks' chemoprophylaxis with chloramphenicol ; all the volunteers were found solidly immune against challenge with the same strain one month after the original inoculation. Among 8 other volunteers immunized in the same way but challenged with the Gilliam strain, 3 developed scrub typhus after an average incubation period of 17 days as compared with one of 11·7 days in unprotected controls challenged with the same strain.

Four volunteers were inoculated with the Gilliam strain and were allowed to develop clinical scrub typhus in which the fever lasted 3–6 days. Two months after inoculation they were challenged with the Karp strain which caused signs of mild illness with an incubation period of 18–19 days.

Among 11 volunteers inoculated with the Gilliam strain followed by chemoprophylaxis as in the first experiment, 6 were challenged a year later with the Gilliam strain and were found immune ; the other 5, challenged with the Karp strain, developed scrub typhus.

Eleven volunteers were inoculated with the Gilliam strain, but were allowed to develop attacks of the disease before treatment with chloramphenicol ; 6 of these were challenged a year later with the Gilliam strain and only one developed the disease ; all the other 5 were attacked after challenge with the Karp strain.

Attacks resulting from challenge with heterologous strains were milder and had significantly longer incubation periods than attacks resulting from similar challenge among uninoculated controls.

One volunteer who had been attacked by scrub typhus 3½ years previously was found immune against the homologous strain of infection.

These and other experiments described in the paper were regarded as showing that a high degree of lasting immunity against homologous strains resulted from vaccination even when the illness was suppressed by chemotherapy but that the immunity against heterologous strains was disappointingly incomplete and short-lived. *John W. D. Megaw*

LE GAC, P., GIROUD, P., LE HENAFF, A. & BAUP, G. Épidémie familiale de rickettsiose varicelliforme dans un village de l'Oubangui-Chari (A.E.F.). [**A Family Outbreak of Varicelliform Rickettsiosis in a Village in Oubangui-Chari (French Equatorial Africa)**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 19–23, 3 figs. on 2 pls.

The authors have already briefly described two cases of "vesicular rickettsiosis" [see this *Bulletin*, 1952, v. 49, 35, 256, 498]. The disease was believed to be the same as rickettsialpox because of certain clinical resemblances and the agglutination of *Rickettsia akari* at a titre of 1–20.

In the outbreak now described, 12 cases occurred among 16 persons living in a mud hut in a small village in the same territory as the previous patients. Apparently the outbreak was explosive. Four of the patients had died before the investigation was started, but most of the 8 survivors had very mild or even symptomless attacks except for the local eschars and the associated lymphangitis. In 5 of the cases there was a single eschar, one patient had 3 eschars widely separated from each other, another patient had 5 eschars in the same region of the body and in the remaining case there was a single eschar surrounded by 2 or 3 macules. No mention is made of a general rash in any of the cases.

One of the patients was a visitor who had spent only one night in the hut ; he was attacked 48 hours later.

Five of the 8 patients reacted at 1–10 to 1–40 with the agglutination test against *R. akari* ; 7 reacted at similar titres against *R. burneti* and all were negative against *R. prowazeki* and *R. mooseri*.

All the patients attributed their illness to bites by " parasites " at night. Numerous rats and mice were found in the mud walls. The only ectoparasite mentioned is the mite *Laelaps nuttalli* which was found on mice (*Mus musculi*). Suspensions of the organs of the mice and rats were inoculated intraperitoneally into white mice. In the course of passages the spleens of the mice were enlarged and in stained smears bodies were seen which were regarded as colonies of rickettsiae but no strain could be isolated.

In view of the occurrence of 4 fatal cases and of the pronounced cicatrization resulting from the eschars the authors now think that the differences between the disease and rickettsialpox should perhaps be emphasized by adding the word African to the name " *Rickettsiose varicelliforme*". *John W. D. Megaw*

GIROUD, P. & YASSEMI, H. À propos de la fièvre Q et de sa diffusion dans le monde, sa constatation en Iran. [**The Spread of Q Fever in the World and its Identification in Iran**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 23–4.

The authors refer to their findings in collaboration with LE GAC *et al.* in Oubangui-Chari [this *Bulletin*, 1951, v. 48, 626, 980] and with JADIN in Ruanda [*ibid.*, 544, 727] regarding the presence of Q fever in the indigenous people and their domestic animals.

They then refer to sera which they have obtained from an area in Iran some 500 miles west of Teheran. Positive agglutination tests were obtained in the case of 2 cows (titres 1 /20 and 1 /40), 2 goats and a sheep (titre 1 /320 each).

Later, in an attempt to isolate a strain of *R. burneti* they inoculated guineapigs with pools of *Ornithodorus lahorensis, Argas persicus* and *Ixodes ricinus* captured in the same area. In 12 such guineapigs, only one was found with an enlarged spleen : microscopically, homogeneous bodies, but no rickettsiae, were seen. Passage is continuing. No positive agglutination was found in the guineapigs' serum.

The authors conclude that there is undoubted serological evidence that Q fever exists among sheep and goats in Iran. *H. J. O'D. Burke-Gaffney*

STOKER, M. G. P. & MARMION, B. P. **Detection of Q Fever Antibodies in Whey by the Anti-Globulin Sensitization Test and Other Techniques.** *J. Hygiene.* 1952, Mar., v. 50, No. 1, 1–11. [14 refs.]

Q-fever antibodies were detected in whey prepared from the milk of cows whose sera gave positive reactions with the complement-fixation test for *Rickettsia burneti*. The whey was prepared by shaking up 10·0 ml. of milk with 5·0 ml. of chloroform, adding 0·5 ml. rennet and incubating the mixture for an

hour at 37°C. On centrifuging the mixture at 3,000 r.p.m. for 15 minutes the whey separated itself and was pipetted off and then heated at 56°C. for 30 minutes.

The only direct comparison between the antibodies of the whey and serum of the cows tested was made by the complement-fixation test ; with this the titres observed in serum samples were much higher on the average than those in whey ; in one extreme case the serum titre was 1–320 and the whey titre 1–2. Direct agglutination tests were much more sensitive than the fixation tests and were made still more sensitive by centrifuging and resuspending the rickettsiae in normal serum or saline. The most sensitive test employed was the anti-globulin sensitization test described by COOMBS and STOKER [see this *Bulletin*, 1951, v. 48, 886] but this has been described by its sponsors as time-consuming and extravagant in consumption of antigen.

From the findings reported in a series of tests of wheys made from bulked samples of milk from 8 herds it looks as if the direct agglutination test would be suitable for making a preliminary survey of herds suspected of being infected with Q fever. *John W. D. Megaw*

YELLOW FEVER

CLARK, H. C. **Endemic Yellow Fever in Panama and Neighboring Areas.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 78–86, 2 maps.

The author served in the Panama Canal Zone from 1909 to 1922, during which period no cases of yellow fever developed in the Canal Zone or in the terminal cities. The rare cases which occasionally reached their hospitals came mostly from the west coast of South America. Subsequently (1935–1936) 7 out of 270 human blood specimens collected in the Darien province gave positive mouse protection tests. During 1948, 5 deaths strongly suggestive of yellow fever occurred in Panama City and the diagnosis was confirmed in 2 of these cases. In January 1950, the first death due to yellow fever west of the Canal occurred on the Atlantic side near the Rio Gatun basin and in June 1951, yellow fever virus was isolated for the first time during a current outbreak near the Costa Rica boundary. Mouse protection tests have been made on a wide range of wild animals in both the eastern and western Panama Canal Zone during 1949 and 1950, and the results indicate that 104 out of 201 examined from the eastern zone were positive, and 68 out of 224 in the western zone. There is evidently, therefore, a wild life reservoir of yellow fever throughout Panama, and the howler monkey, the spider monkey and the white face (*Cebus*) were found to show the highest rate of positive mouse tests. *E. Hindle*

ELTON, N. W. **Public Health Aspects of the Campaign against Yellow Fever in Central America.** *Amer. J. Pub. Health.* 1952, Feb., v. 42, No. 2, 170–74.

It seems that sylvan yellow fever has been present in sub-endemic form in eastern Panama since 1929. It apparently started to spread about 1948 when epidemics occurred near Panama City [see COURTNEY, this *Bulletin*, 1950, v. 47, 1078]. It reached western Panama in 1951 and has since travelled as an epidemic wave at an estimated rate of 11 to 15 miles a month. It is travelling northwards along the Atlantic side of the isthmus and its arrival in Costa Rica had been foreseen about September, 1951. The outbreaks in that country occurred, however, in July and it was found that the course taken by the epidemic wave had been mistakenly interpreted. Details of the

actual progress are given and the estimation of a slowly progressive wave with a velocity of 12 to 15 miles per month is still maintained. Further progress is expected through Nicaragua until it terminates in Mexico.

The wave is like a grass fire in that it burns out all available fuel *en route*, leaving very few non-immune men or monkeys. Cases in the wake of the epidemic do not occur and no return is expected.

A helicopter was used in the vaccination campaign in Panama, chiefly to get at people in hopelessly isolated places, for which purpose it was invaluable.

A disease resembling yellow fever is said to have been known in pre-Columbian times and legend associates it with the wholesale deaths of monkeys in the forests. Severe epizootics have been noted in association with the present human epidemic.

[The paper needs a map for its proper understanding. The abstracter enjoyed the account of the helicopter which apparently helped to vaccinate the rural population.] *G. Macdonald*

Dick, G. W. A. **A Preliminary Evaluation of the Immunizing Power of Chick-Embryo 17D Yellow Fever Vaccine inoculated by Scarification.** *Amer. J. Hyg.* 1952, Jan., v. 55, No. 1, 140–53. [16 refs.]

This paper describes two experiments on volunteers.

In the first experiment, 3 groups of volunteers, numbering 104, 103 and 107 respectively were vaccinated, (*a*) with French neurotropic (Dakar) vaccine by scarification ; (*b*) with a 17D vaccine of approximately the same mouse intracerebral LD50 strength as the Dakar vaccine, also by scarification ; and (*c*) with the 17D vaccine given by subcutaneous injection. Pre-vaccination sera and sera collected 32 days after vaccination were tested for yellow fever antibody by an intraperitoneal 1 per cent. virus test [Smithburn, this *Bulletin*, 1946, v. 43, 214] modified by substitution of 0·2 per cent. bovine albumin for the serum-saline diluent. All 3 groups showed good antibody development, but the proportion of positive post-vaccination sera was slightly lower in the 17D scarification group (84·3 per cent.) than in either the Dakar scarification group (98·2 per cent.) or the 17D subcutaneous group (94·1 per cent.), the difference being significant.

In the second experiment, a pool of 17D virus from several ampoules was divided into 3 lots, of which one was used to vaccinate 25 subjects by scarification and the second, another 25 subjects, also by scarification, but with saline as diluent instead of gum arabic. The third lot was used to vaccinate a third group of 25 by subcutaneous injection. Sera taken 28 days after vaccination were compared with pre-vaccination sera by the mouse protection test.

The result indicated that 17D vaccine given by scarification gave a good immunization result whether suspended in gum arabic or saline (95·2 and 95·7 per cent. positive respectively). 17D subcutaneously gave 100 per cent. immunization, but the difference is not considered significant.

No untoward reactions to vaccination were observed in either experiment.

The results of these experiments are compared with other comparisons of the Dakar and 17D vaccines [this *Bulletin*, 1947, v. 44, 73].

It is clear that 17D vaccine given by scarification produces a good immunity. However, the Dakar vaccine, made from mouse brain, is cheaper and easier to prepare. If the dangers of reaction and of contamination with other viruses from the mouse brains can be ignored, a mouse brain vaccine has evident advantages. The author suggests that a 17D mouse brain vaccine would be worth a trial as a scarification vaccine. *E. T. C. Spooner*

DENGUE AND ALLIED FEVERS

SABIN, A. B. **Research on Dengue during World War II.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 30–50, 1 fig. [11 refs.]

The author describes a number of important studies carried out at the U.S.A. Dengue Research Unit established by the Army Department in 1944 at Cincinnati to investigate the possibility of improving methods of prevention and diagnosis of dengue.

Several papers dealing with various aspects of the dengue problem have already been published by the author and his colleagues ; abstracts of most of these will be found in this *Bulletin* in the years 1945, 1947, 1948 and 1949. In the present paper many of the remaining gaps in knowledge of the virus of dengue have been filled by the author and his team of experts who enjoyed the great advantages of having at their disposal exceptional laboratory facilities, a large and constant supply of human volunteers and numerous samples of sera from dengue patients. Infected serum, even after prolonged storage in dry ice, was found to contain up to a million human infective doses per ml. The size of the virus particles was found to be 12–25 millimicrons (mμ) and by electron microscopic examination dumbell-shaped bodies were found in highly infective human serum.

Numerous attempts at direct cultivation of the virus in yolk sacs completely failed but after adaptation by passage through mice successful passages were made. The disease was caused in volunteers by instilling large doses of the virus into the nose or conjunctiva ; smaller doses—up to 10,000 minimum infecting doses—gave negative results. Infective serum in the frozen state remained active for long periods, up to 5 years in one case. The virus was inactivated by 0·05 per cent. formalin.

Volunteers remained immune after an attack, up to at least 18 months against challenge inoculation with the same strain, but against a heterologous strain the immunity was partial and lasted only about 2 or 3 months.

Two distinct immunological types of virus were found ; one included a strain from Hawaii, two strains from Calcutta and one from New Guinea.

Three other strains from New Guinea belonged to the other types. The 4 strains from New Guinea were isolated from patients who had no rash, and two of them were from patients whose febrile attacks lasted only about two days, yet the inoculated volunteers developed typical dengue with a rash.

The authors suggest that atypical cases of dengue may be due to reinfection with heterologous strains ; they refer to the frequent finding that cases which medical men refused to diagnose as dengue were proved by human inoculation and by immunological tests to be caused by the virus of dengue.

The simultaneous inoculation of volunteers with yellow-fever vaccine and dengue virus, the latter in amounts ranging from 10 to 1,000,000 minimum infecting doses, was followed by short mild attacks of dengue with a prolonged incubation period. The same result followed when the dengue virus was injected 7 days after the yellow fever vaccine, but when the interval between the injections was 5 weeks a typical attack of dengue occurred. Six out of 7 rhesus monkeys survived inoculation with lethal doses of yellow fever virus when these were given 2–3 days after the animals had been inoculated with dengue virus. When the interval between the two injections was one month 6 of the 8 experimental monkeys died. *Aëdes* mosquitoes infected with dengue were found incapable of transmitting yellow fever to monkeys in conditions in which normal mosquitoes readily transmitted the infection ; this finding suggests to the author that yellow fever infection introduced to an area in which dengue is endemic may fail to establish itself among the local mosquitoes.

By repeated intracerebral passage through very young mice the virus became adapted to passage through adult mice for which its virulence increased progressively up to at least the 80th passage.

After the 7th mouse passage the virus ceased to produce clinical dengue in volunteers but it still caused solid immunity and so was suitable for the production of a live vaccine ; 50,000 doses of this were prepared for a field trial but the sudden ending of the war made this impracticable.

Aëdes mosquitoes which had previously fed on persons inoculated with dengue virus of the 10th mouse passage transmitted modified attacks of dengue to volunteers who developed a rash and leucopenia but remained afebrile.

With a virus fully adapted to mice a mouse-neutralization test became available ; with this it was shown that immunizing antibodies were present within a week of the onset of experimental attacks of dengue and that they persisted for at least 4 years.

Three strains of mouse-passage virus were submitted for study by Dr. S. Hotta and were found to be true dengue [see below]. Two other strains of mouse-passage virus sent by Japanese workers were Rift-Valley fever and fixed rabies virus respectively. *John W. D. Megaw*

HOTTA, S. **Experimental Studies on Dengue. I. Isolation, Identification and Modification of the Virus.** *J. Infect. Dis.* 1952, Jan.–Feb., v. 90, No. 1, 1–9, 8 figs. [13 refs.]

Three strains of dengue virus were isolated from patients in Japan in 1943–44 by intracerebral inoculation of mice weighing 6–7 gm. The strains have been maintained ever since through 70 to 124 mouse passages.

Intracutaneous injection of brain substance of mice of the 5th to the 33rd passages caused attacks of dengue in 4 of 5 volunteers. With material obtained from mice of the 35th to the 60th passages attempts to infect 8 volunteers failed.

The mouse virus was neutralized by serum of dengue patients and even after the mouse-adapted virus had ceased to cause the disease in man the persons inoculated became immune against experimental infection.

The findings agree closely with those described by SABIN *et al.* [see above]. *John W. D. Megaw*

HOTTA, S. **Experimental Studies on Dengue. II. A Skin Reaction observed during the Epidemic of Osaka, Japan, in 1944.** *J. Infect. Dis.* 1952, Jan.-Feb., v. 90, No. 1, 10–12.

A test is described in which the intracutaneous injection of an inactivated suspension of brain substance of mice infected with dengue caused local induration or redness or a combination of the two in patients suffering from dengue. In some cases there was vesicle formation or necrosis of the lesion. The reaction was positive on the 1st or 2nd day but was weak and irregular ; after the third day the reaction was more pronounced and reached its height within 24 hours.

Three healthy adults and 7 patients with scarlatina showed no reaction, but 5 patients with typhoid fever and one with murine typhus "showed a distinct but generally lesser reaction". [Further study of the test is obviously needed.] *John W. D. Megaw*

MEIKLEJOHN, G., ENGLAND, Beatrice & LENNETTE, E. H. **Propagation of Dengue Virus Strains in Unweaned Mice.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 51–8.

Several strains of dengue virus were studied, including 3 already adapted to passage through adult mice by 55–104 transfers through baby mice and 2 others which were isolated and passed through baby mice.

Attempts to pass the strains through adult mice convinced the authors that mice 2–6 days old were much more suitable than those 3–4 weeks old for the isolation and brain passage of the virus and for neutralization tests.

John W. D. Megaw

MEIKLEJOHN, G., ENGLAND, Beatrice & LENNETTE, E. H. **Adaptation of Dengue Virus to the Hamster.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 59–65. [13 refs.]

Two strains of mouse-adapted virus were readily passaged intracerebrally through hamsters 2–4 days old and were nearly as lethal to them as to mice of the same age. Attempts at passage through adult hamsters failed. One of the strains had been adapted to passage through mice aged 2–4 days, the other was of the 104th mouse-brain passage. *John W. D. Megaw*

SCHLESINGER, R. W. & FRANKEL, J. W. **Adaptation of the " New Guinea B " Strain of Dengue Virus to Suckling and to Adult Swiss Mice. A Study in Viral Variation.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 66–77.

A New-Guinea strain of virus which had been found by SABIN to be immunologically different from the Hawaiian strain [p. 686] was transferred through 8 passages in mice of the " dba " type ; it caused weakness or paralysis in 50 per cent. of the mice. Lyophilized brain substance of one of the mice of the 4th passage was inoculated intracerebrally 5 years later into baby mice and after 2 passages was found consistently lethal for 1–7-day-old mice. This strain after 26 passages through baby mice became consistently pathogenic for adult Swiss mice ; by neutralization tests it was found to be immunologically distinct from the Hawaiian strain. *John W. D. Megaw*

RABIES

STARR, L. E. **What the Physician should know about Rabies.** *Southern Med. J.* 1952, Apr., v. 45, No. 4, 370–74.

VISANI, A. & ANDREONI, G. Osservazioni cliniche su 23 casi di rabbia umana e considerazioni sulla profilassi. [**Clinical Observations on 23 Cases of Human Rabies and Considerations of Control Measures**] *Ann. d. San. Pubblica.* Rome. 1951, Nov.–Dec., v. 12, No. 6, 2167–80. [49 refs.] English summary.

This paper deals with the 23 cases of human rabies seen in a Rome teaching hospital between 1936 and 1951. One patient was admitted in 1942, 9 occurred in 1944, 5 in 1947, 3 in 1948, 2 in 1949 and 3 in 1950. Twenty-one were male. Fourteen were children aged 4–16 years, the ages of the other 9 varied between 21 and 85 years. All cases proved fatal and diagnosis was confirmed by post-mortem examination. Dog bite caused the disease in every case. In many of them the biting animal was a stray dog which remained untraced.

Information is tabulated showing, amongst other particulars, the age, incubation period, interval between onset and admission, date of admission and of death, site of bite or bites, prophylactic treatment, if any, history before and signs and symptoms after admission, for each case.

In 4 cases the injury was so slight that the patients were not sure if they had really been bitten. The incubation period in these was 53, 86, 45 and 25 days respectively. The shortest incubation period was 13 days and the longest was 207 days, both patients having been bitten in the hand. Six other patients had been bitten in the hand or hands, 1 in both forearms, 6 in the head, 2 in both head and upper limbs and 6 in the lower limbs. The authors believe that besides the site of the bite there are other factors, such as the quantity, virulence and neurotropic properties of the virus and the varying receptivity of the nervous system in each person, which account for the length of the incubation period.

Fifteen of the patients had received prophylactic treatment, which had been delayed in 3 and was irregular or incomplete in 3 others.

One case was of the paralytic type, in a man of 48, bitten in both forearms on 22nd February 1947. Diagnosis was confirmed by examining the brain of the biting dog. Prophylactic treatment with phenolated vaccine was commenced one day after the biting, a complete course of 20 injections being followed immediately by onset of the disease in mid-March, death supervening after 6 days.

The authors discuss the signs and symptoms observed in their cases, the treatment which they have tried and the control measures which they deem to be called for in Italy. They refer hopefully to HABEL'S work on passive immunization in Iran. *J. Cauchi*

LÓPEZ FERNÁNDEZ, F., PÉREZ SORÁ, E. & AROCHA MACHADO, A. Complicaciones neurologicas de la vacunacion antirrabica. [**Neurological Complications of Anti-Rabies Vaccination**] *Archivos Hospital Universitario.* 1951, Nov.–Dec., v. 3, No. 6, 685–702, 8 figs. on 6 pls. [45 refs.]

This article starts with an excellent review of the nervous complications of anti-rabies vaccination as recorded in the literature ; references number 45 and extend over more than half a century. The authors then give a brief account of 9 cases of their own ; 8 of the patients had been bitten by dogs and one by a cat ; one, a boy of 8 years, had been vaccinated against rabies and smallpox, and another of 13 years against tetanus. Of the 9 patients, 7 were males whose ages ranged between 5 and 39 years, 2 were females, aged 28 and 42. One, a man of 24 years, died on the fifth day with fever and signs of encephalomyelitis ; the others recovered, 2 slowly, 6 rapidly. As regards symptoms, 7 showed those of myelitis or encephalomyelitis, one polyneuritis and one the Guillain-Barré syndrome as a complication of the vaccination. A local inflammatory reaction in nearly all preceded the onset of nervous symptoms. One of the most severe cases was in a boy of 13 years who had been bitten by a dog and had had an anti-tetanus injection ; he was very ill with encephalitis, ptosis, convergent strabismus and facial paralysis. He was given cortisone and made an unexpectedly rapid recovery. There are excellent photographs of 3 of the patients and photomicrographs of some of the histological changes in the brain. *H. Harold Scott*

PLAGUE

POLLITZER, R. **Plague Studies. 3. Problems in Immunology.** *Bull. World Health Organization.* Geneva. 1952, v. 5, No. 2, 165–226. [190 refs.]

This is the 3rd of a series of studies which when complete will be published as a monograph on plague by the World Health Organization. It is on the same lines as the previous studies by the same author [see this *Bulletin*, 1952, v. 49, 388, 616]. The literature dealing with the immunological aspects of plague is reviewed and the bibliography contains 190 references. The subjects discussed include : the virulence of strains of plague bacilli ; the toxins, antigenic structure and immunizing powers of the bacilli ; killed and live plague vaccines ; production of immune sera ; and sero-diagnostic tests.

In dealing with controversial questions the author maintains a judicial attitude ; for example he states the opposing views regarding the relative value of killed and live plague vaccines and sums up by saying that if all the available evidence on both sides is weighed no doubt can exist in the impartial mind that equally good laboratory results can be obtained with both vaccines. The relative merits of the vaccines in the prophylaxis of human plague will be discussed in a future study.

This series of articles and the manual that is promised will be of great value to all workers on plague. So complete and fully documented a survey of the literature of plague could not have been prepared and published without the support of an organization like the W.H.O. *John W. D. Megaw*

CHOLERA

LAHIRI, S. C. **Cholera Collapse and its Treatment by Knox Special Gelatine Solution.** *Indian Med. Gaz.* 1951, Sept., v. 86, No. 9, 396–400. [10 refs.]

A study was made of 90 seriously collapsed cholera patients who were passing into a condition of secondary shock. Most of these had been treated with hypertonic saline, alkaline saline and glucose by the intravenous route, associated in many cases with circulatory stimulants, but the blood pressure had failed to recover. [There is no mention of the number of cholera cases from which this series was selected.] The systolic blood pressures ranged from below 60 to 80 mm. Hg and the majority were between 60 and 70 mm. Hg. They were anuric, most of them had an increase of urea and non-protein nitrogen, and there was an increase of total plasma protein with a reversal of the albumin /globulin ratio ; chlorides were diminished.

Knox Special Gelatin solution was given in all these cases. It was administered intravenously at the rate of 60 to 80 drops a minute, usually up to a total of 500 ml. of a 6 per cent. solution in adults ; in a few cases 1,000 ml. were given.

Of the 90 patients, 40 died and 50 recovered.

Human plasma was given to 4 patients ; 3 of them died.

The gelatin solution also was given in the early dehydration stage, but the response was obviously less satisfactory than that produced by saline and glucose.

[No extravagant claims are made, and it is obvious that this report will inspire no confidence in this form of treatment. A controlled series will be necessary, in which in half the cases treatment with saline is continued and in the other half gelatin solution is substituted.] *L. E. Napier*

Das, A., Ghosal, S., Gupta, S. K. & Chaudhuri, R. N. **Terramycin in Cholera.** *Indian Med. Gaz.* 1951, Oct., v. 86, No. 10, 437–44.

In vitro experiments with terramycin showed that a solution containing 2–5 μgm. per ml. completely inhibited the growth of *Vibrio cholerae*.

A clinical trial was undertaken with 72 subjects, half of whom acted as controls ; alternate admissions were placed in each group. In most cases a positive culture was obtained from the stools on admission but the diagnoses were primarily clinical. In all cases hydration was carried out by intravenous saline in amounts varying from 2 to 11 pints in the first 24 hours, as the clinical condition indicated. Terramycin was given in the following dosage :—

Four capsules (1·0 gm.) on admission, 2 after two hours, and 2 every 6 hours up to the end of the third day, a total of 24 to 30 capsules (6 to 7·5 gm.). If the drug was vomited the dose was repeated.

Results : All patients with a systolic blood pressure above 50 mm. Hg survived. Of the 36 patients treated with terramycin 6 died and in the control group 8 died : the difference is not statistically significant.

Of the treated cases 29 showed vibrios in the stools before treatment and of these 26 had daily examinations subsequently. At the end of 24 hours only 4 (15·4 per cent.) were positive, whereas of 17 control cases similarly examined all were positive at the end of 24 hours, 16 were positive at the end of 48 hours, and 10, 3 and 1 at the next three successive examinations.

It is thus apparent that terramycin causes the rapid disappearance of the causal organism, but does not affect the clinical course of the disease. The results are shown in detail in tables. *L. E. Napier*

Konar, N. R. & Sengupta, A. N. **Terramycin in Cholera.** *Indian Med. Gaz.* 1951, Oct., v. 86, No. 10, 469–71.

There are tables showing the deaths from cholera in Greater Calcutta ; deaths rose from 880 in 1946/7 to 2,402 in 1948/49. A second table shows the total admission for cholera to the Nilratan Sarkar Medical College Hospital and the death rate ; the latter rose from 5·5 per cent. in 1946 to 32·7 in 1950. [No explanation is offered for this extraordinary deterioration in the results of treatment ; there was, however, a decline in deaths to 18·3 per cent. in the first half of 1951 which is presumably the period of the present investigation.]

One hundred patients consecutively admitted and taken alternately into each of two groups—the "treated" cases and controls—formed the clinical material : the majority were young adults. The patients of both groups were given intravenous saline solution according to requirement, an average amount of 9 pints in 3 days : the "treated" group were given in addition terramycin in doses of two tablets (0·50 gramme) every 6 hours, up to an average total of 6 gm. The deaths were 4 in the terramycin series against 3 in the control series.

However, daily stool cultures were done in a certain number of cases and it was found that, although many of the control cases had "positive" stools up to the fourth day, that is 72 hours after treatment was begun, only 25 per cent. of the "treated" cases passed vibrios on the third day (48 hours) and none on the fourth day.

Thus, the drug caused no clinical improvement but an earlier disappearance of the *Vibrio cholerae* from the stools.

[The results obtained in this investigation, compared with those of Das *et al.* (above), suggest that the initial loading of the dosage produced earlier "sterilization" of the stools in the latter series.] *L. E. Napier*

GOPAL, B. **Compulsory Preventive Inoculation as a Measure of Control of Cholera in Fairs.** *Indian Med. Gaz.* 1951, Nov., v. 86, No. 11, 510–14, 1 graph.

The part played by fairs and festivals in disseminating cholera in India is well recognized. The largest of these are the Kumbh fairs held every 6 years alternately at Hardwar and Allahabad and the Ardh-Kumbhs in intervening years, also at either place, a major pilgrimage taking place every 3 years. The attendance at the Kumbh fair may be over a million on the main day. The peak years of cholera usually coincide with those in which the fairs are held and it is stated that all the 6 pandemics of cholera which occurred during the last century had their origin in the fairs.

The sanitary and water-supply arrangements for the fairs have been continuously improved and this has probably had a considerable effect in reducing the amount of cholera, but such improvements have not been entirely effective in eliminating the disease. The success obtained in preventing the outbreak of cholera at the Pandharpur fair in the Bombay Presidency by prohibiting the entry of pilgrims to the fair unless inoculated with cholera vaccine showed the value of the measure and helped to prompt the adoption of indirect compulsory inoculation at the large fairs in the United Provinces. This was first enforced in 1945 at the time of the Ardh-Kumbh fair at Hardwar. Barriers were set up at railway stations and at other main approaches to Hardwar, and uninoculated persons were prevented from entering an area within a radius of 10 miles from the fair. Those arriving uninoculated could be inoculated at the barriers. Inspection posts were set up to intercept infectious cases proceeding to or from the fair, with facilities for isolation and treatment. Of the pilgrims attending, 95 per cent. were inoculated. No case of cholera occurred during the two months the fair lasted and there was no outbreak in the United Provinces or the Punjab on dispersal. On the other hand during the Ardh-Kumbh at Allahabad in 1948 inoculations were on a voluntary basis and not more than 0·5 per cent. accepted them. There were 267 cases of cholera at the fair and a widespread explosive outbreak followed which was traced to returning pilgrims. In the same year at a fair at Ayodhya 75 per cent. were inoculated and no cholera occurred. A similar experience was noted in 1949 at two large fairs. At one of them 5 per cent. of pilgrims were inoculated voluntarily and a severe cholera outbreak occurred ; at the other with 90 per cent. inoculated under a compulsory scheme a single imported case only occurred with no subsequent spread. Other instances of similar kind are given.

The opinion is expressed that " preventive inoculation against cholera, as a measure of control of the disease, particularly in religious fairs such as are held in India, appears to have proved its efficacy, and along with the provision of adequate sanitary arrangements and controlled water-supplies should form a compulsory requirement of any scheme prepared to prevent sickness and disease in these fairs ".

[The measures for interception of infectious cases proceeding to or returning from the fairs and for their isolation would appear to be important.]

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

d'ANTONI, J. S. **Concepts and Misconceptions in Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 146–54.

This, the first issue of the *American Journal of Tropical Medicine and Hygiene*, is a memorial number to Dr. C. F. CRAIG, who died in December 1950. As is

well known, Craig's chief preoccupation was with amoebiasis. The author of this paper was associated with Craig, first as a pupil and later as a co-worker ; he has followed Craig's teaching and has assimilated his views, which he here restates in general terms. He postulates [without additional evidence] that amoebiasis is always a pathological condition ; he holds it to be responsible for so diverse a symptomatology, unconnected with the bowel and ranging from gynaecological disorders to fibrositis, that a diagnosis inferred on purely clinical grounds obviously is impossible. Nevertheless he holds that specific treatment of the parasitic infection resolves these symptoms, and therefore that there is a causal relationship between the infection as revealed by stool examination and the symptoms. Among other views expressed are the belief that many infections detected in adults (in N. America) are contracted during the first year or two of life from parents or nurses ; that parasites are less numerous [and therefore harder to find] in the stools in the winter than in the summer months ; and that there is no direct relationship between the output of parasites and the clinical symptoms. The question is raised as to why the incidence of amoebiasis in the United States should be so high (an estimated 10 to 29 per cent.) " in the best sanitated country in the world ".

The author concludes with the statement that " amebiasis at the present time is a confused, incompletely understood, and much misunderstood, disease ", and he adds that we are largely ignorant of its prevalence, epidemiology, diagnosis and treatment.

[The literature cited is scanty and solely of American origin. No reference is made to the possibility that the infection might exist as a commensal one. Many of the opinions held by the author will not be acceptable to European workers.] *A. R. D. Adams*

Hoare, C. A. Amoebiasis in Grossbritannien. [**Amoebiasis in Britain**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Feb., v. 3, No. 3, 357–8.

The English summary appended to the paper is as follows :—

" In discussing amoebiasis in countries with a temperate climate, H.-P. Pöhn erroneously attributed to Hoare the statement that in Great Britain all the infections are due to *Entamoeba hartmanni*. In the present note, the author points out that he had actually stated that among the symptomless carriers in England only 50% harbour *E. hartmanni*, whereas the other 50% are infected with the large race of *E. histolytica*." [See this *Bulletin*, 1950, v. 47, 1083 ; 1952, v. 49, 47.]

Hoare, C. A. **The Food Habits of *Entamoeba histolytica* in its Commensal Phase.** *Parasitology*. 1952, Mar., v. 42, Nos. 1/2, 43–7, 1 fig. [18 refs.]

The view of Kuenen and Swellengrebel [this *Bulletin*, 1914, v. 3, 78] that *E. histolytica* could exist as a tissue parasite or as a commensal in the lumen of the gut has received wide support, but has also been criticized particularly in Britain and America. Arguments in favour of the above view have previously been put forward by the present author [this *Bulletin*, 1948, v. 45, 76 : 1950, v. 47, 1083]. The evidence in support is based on the harmless nature of the infection which may occur in monkeys and sometimes rats infected with *E. histolytica*, the passage of enormous numbers of this parasite without red cells in symptomless carriers on purgation, the absence of detectable lesions in the gut and of occult blood in the faeces, as well as the presence of ingested bacteria in parasites obtained fresh from the gut or from culture. In the present investigation only the food habits of *E. histolytica* are dealt with. By examination of normal healthy amoebae with typical nuclear structure and

accompanied by tetra-nucleate cysts in the faeces of symptomless carriers and in those of chronic cases of amoebiasis, the author has convinced himself and others that *E. histolytica* does engulf bacteria from the lumen of the gut. In the human faeces examined 30 to 100 per cent. contained bacteria, chiefly cocci, diplococci, bacilli and "bipolar" bacteria similar to those in faeces outside the amoebae, while in all cases red cells had not been engulfed. The results are depicted in drawings. Similar drawings depict the findings for rat and monkey faeces in presence of *E. histolytica* infection. The author considers that the evidence for a commensal phase in the life history of *E. histolytica* is overwhelming and that under the conditions mentioned trophic amoebae normally feed on bacteria. The food habits can, however, undergo rapid change and haematophagous amoebae may then prevail. *J. D. Fulton*

NEAL, R. A. **The Duration and Epidemiological Significance of *Entamoeba histolytica* Infections in Rats.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 363–70. [24 refs.]

In a previous paper [this *Bulletin*, 1951, v. 48, 640] the author has shown that the degree of ulceration produced in rats by different strains of *Entamoeba histolytica* varied. Since the results of these infections were assessed a week after the inoculation of amoebae, it is conceivable that the less virulent strains might require a longer period to produce the caecal lesions. In order to test this possibility, experimental infections of rats with different strains were observed for longer periods of time.

Young rats were inoculated intracaecally with cultures of four strains of amoebae: two isolated from human cases of amoebic dysentery, and two from contact carriers. Previously the former had produced ulcerations in rats within a week, while the latter produced none. In one set of experiments, 6 rats were inoculated with a virulent strain (M) and 6 with an avirulent one (OM), and the condition of the caecum was determined 3 and 5½ months later, by exposing it through an incision in the abdominal wall, and withdrawing a sample of the contents for microscopical examination. In the rats infected with the virulent strain all the caeca were ulcerated, whereas in those infected with the avirulent strain only one animal showed a small area of inflammation. The pathological changes in rats after prolonged infection were thus similar to those after one week. In another series of experiments rats were inoculated intracaecally with two virulent (M, MDS) and two avirulent strains (FY, OM). Their faeces were examined and cultures were made at frequent intervals. It was found that the infections persisted for periods from 8 to 95 weeks. While dysenteric symptoms were not observed in any of these animals, diarrhoeic stools were occasionally passed, especially in rats infected with the virulent strains.

The great majority of the rats passed cysts at some period of the infection, but they were rarely seen on more than 6 occasions in the same animal. The infections usually terminated spontaneously, but among the rats infected with a virulent strain (M) some died. A comparison of the diagnostic value of direct microscopical examination of the faeces and the cultural method, showed that the former revealed from 5 to 25 per cent. of the infections, while the latter revealed 40–50 per cent.

In assessing the epidemiological rôle of rats in human amoebiasis, the author points out that only a small number of infected animals produce cysts in sufficient numbers to be of importance, therefore their rôle as a reservoir is negligible, but under suitable conditions they may assist in the spread of amoebiasis. *C. A. Hoare*

De, S. N. & Sengupta, K. P. **The Amoebic Appendix and its Perforation.** *J. Indian Med. Ass.* 1952, Mar., v. 21, No. 6, 243–5, 2 figs. [26 refs.]

A case in Calcutta.

Sodeman, W. A., d'Antoni, J. S. & Doerner, A. A. **Emetine Intoxication.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Mar., v. 46, No. 2, 151–8. [11 refs.]

In spite of some opinions that emetine is an obsolete drug it undoubtedly is of value in the treatment of intestinal and of extra-intestinal amoebiasis, and it has its uses in that of balantidiasis and of some fluke infections. There have been conflicting views as to the toxic effect of emetine therapy. One hundred and eleven patients have been treated with emetine by the authors for a variety of conditions, but predominantly for amoebiasis ; 78·4 per cent. of these were males. In 5 cases (4·5 per cent. of those treated) there were symptoms of emetine intoxication ; 3 (60 per cent.) of them were women. Another patient outside this series was seen ; he suffered from emetine poisoning after 22 grains of the drug had been given within 8 days.

No relationship between age and proneness to emetine toxicity was noticed in the 5 persons affected. The symptoms took the form of muscular weakness and neuritis in 3 of the cases ; tachycardia in 3 ; tachycardia with a fall in blood pressure in 1 ; tachycardia with vertigo and syncope in 1 ; nausea and vomiting in 1 ; and nausea, vomiting and diarrhoea in another.

Electrocardiographic changes were observed in one of the patients with tachycardia, but none was found in those with neuritic signs. Repeated electrocardiographic records were made of 38 of the 111 patients ; 10 (26·4 per cent.) of these 38 showed some cardiac changes due to the drug ; the details are set forth in the paper.

The authors conclude that the usual dosage of emetine (10–12 grains in 1 grain daily doses) may cause evidence of toxicity in some adults. They recommend that the dosage should be based on a dose-weight ratio ; and that it should not exceed 10 mgm. /kgm., which has been shown by animal experiment to be well tolerated. Minor toxicity may result, unpredictably, even from this scale of dosage in man. *A. R. D. Adams*

Faure, L. & Lescommères, J. Forme cardiaque de l'intoxication émétinienne. [**Cardiac Form of Emetine Intoxication**] *J. Méd. de Bordeaux.* 1952, Mar., v. 129, No. 3, 244–6.

Report of a case.

McVay, L. V., Jr., Laird, R. L. & Stern, T. N. **Neomycin in the Treatment of Human Amebiasis.** *Amer. J. Med. Sci.* 1952, Jan., v. 223, No. 1, 20–24. [19 refs.]

Neomycin, prepared from the soil fungus *Streptomyces fradiae,* is closely related to the antibiotics streptomycin and streptothricin. It is a basic compound which is most active in an alkaline *p*H, is soluble in water, and is thermostable. It is effective against numerous Gram-negative and Gram-positive organisms ; and it is active against streptomycin-resistant and streptomycin-sensitive organisms. It shows activity *in vitro* against many forms of *Mycobacterium tuberculosis,* and against *Salmonella typhi* and *Pseudomonas* and *Proteus* organisms, but exerts little action on *Clostridium.* In man neomycin, it has been stated, is excreted primarily through the kidneys. When given

intramuscularly in certain human cases it has caused complete deafness or temporary impairment of hearing, and a rise in the blood non-protein nitrogen, microscopic haematuria, and albuminuria. When given by the oral route it causes minimal toxicity.

A strain of *Entamoeba histolytica* obtained from an acute case of amoebic dysentery was maintained in culture on Nelson's egg-yolk alcoholic-extract medium. To the overlay of the cultures were added varying concentrations of neomycin. Concentrations of 500 to 1,000 units of neomycin per ml. of the overlay were found to kill all the contained amoebae within 48 hours, but the lower of these two concentrations did not significantly diminish the bacterial content in the overlay.

Eight patients with mildly symptomatic intestinal amoebiasis were treated in hospital orally with neomycin. Six of these patients were given 50,000 units every three hours for the first 24 hours, and then 50,000 units every six hours to a total of 1,600,000 units ; the course extended over 7 days. Three of them subsequently suffered a parasitic relapse ; the stools of the other 3 were free from parasites over an observation period of 3 months. The 3 patients who relapsed were then given 50,000 units of neomycin every three hours to a total of 4,800,000 units over 12 days ; the stools of all 3 of them remained free from parasites over a period of 3 months' observation. Two other patients were similarly treated ; the stools of both were parasite-free for a month after treatment ended.

In only one of the 8 patients were there significant toxic side-effects. In this case the blood non-protein nitrogen and blood-urea nitrogen rose from 30 and 11·4 mgm. /100 ml. to 64 and 18 mgm. /100 ml. respectively, and there was heavy albuminuria. By the third day after the completion of treatment the blood and urine chemistry had returned to normal.

The authors record as illustrations the detailed investigations carried out before, during, and after the treatment of two of the patients. They conclude that neomycin is an effective amoebicide both *in vitro* and *in vivo* ; but they consider that its toxic side-effects require detailed study before the drug can be used indiscriminately for the treatment of human amoebiasis.

A. R. D. Adams

Killough, J. H., Magill, G. B. & Smith, R. C. **The Treatment of Amebiasis with Fumagillin.** *Science.* 1952, Jan. 18, 71–2.

Fumagillin, one of the more recent of the antibiotics, has been stated to possess marked amoebicidal activity [this *Bulletin,* 1951, v. 48, 640]. The present paper is a record of the results obtained with it in the treatment of 22 cases of amoebiasis in Egypt ; 12 of these were asymptomatic, 9 patients suffered from minor intestinal symptoms, and one had severe amoebic dysentery. The drug was given orally in capsules to 18 of the patients over a period of 14 days ; 2 of these patients had 5 mgm. daily ; 2 had 5 mgm. twice daily ; 3 had 10 mgm. twice daily ; 4 had 35 mgm. daily (in 3 doses) ; and 7 had 50 mgm. daily (in 3 doses). Four other patients were treated over 7 days ; one with a 35 mgm. daily dosage, and 3 with 50 mgm. daily. The toxic side-effects of these treatments were negligible ; two patients receiving 50 mgm. daily complained of dizziness, and 4 of anorexia.

In all but the acute case, *Entamoeba histolytica* rapidly disappeared from the stools, and the parasite did not reappear there while the course of treatment continued. The two patients given 5 mgm. daily soon relapsed parasitically ; one given 10 mgm. daily did so after some weeks. The stools of the others remained free from *E. histolytica* for periods of 3 to 8 weeks of observation.

The stools of the patient suffering from acute dysentery were not cleared of parasites until the eighth day, and the parasites reappeared in them the day after treatment ended. This patient then developed amoebic hepatitis.

It was observed that, where present, all the other common intestinal protozoa temporarily diminished or disappeared from the stools during fumagillin treatment ; but they recurred in some cases subsequently.

It is concluded that fumagillin is non-toxic when given in doses of up to 50 mgm. daily for 2 weeks, and that it shows activity against all the common intestinal protozoa, being most effective against *E. histolytica*.

A. R. D. Adams

Luttermoser, G. W., Haskins, W. T., Coleman, Nell & Jumper, J. R. **Experimental *Endamoeba histolytica* Infections in Rabbits with reference to Chemotherapy.** *Amer. J. Trop. Med. & Hyg.* 1952, Jan., v. 1, No. 1, 162–70. [22 refs.]

A number of laboratory animals including the cat, dog, monkey, hamster, rabbit, guineapig, and rat have been used with varying success as experimental hosts for *E. histolytica*. The most generally used method appears to be that of Jones [this *Bulletin*, 1947, v. 44, 313] who inoculated young rats intracaecally with trophozoites. The present investigation was undertaken to assess the value of the rabbit as experimental host, which Tobie [*ibid.*, 1950, v. 47, 464] had found suitable, and to use it in tests with chemotherapeutic agents. The animals used were 4 to 12 weeks old, and appeared to be free of natural amoebic infection. A week before inoculation they were put on a deficient diet. Two cultures of *E. histolytica* obtained from patients with acute amoebiasis were used and the rabbits after laparotomy under anaesthesia were inoculated intracaecally with 5,000 to 600,000 trophozoites. Inoculations of the medium alone and with accompanying bacteria were used for controls. Drug treatment by the oral or subcutaneous route was begun some days prior to, at the same time as, or some days after infection, and was continued for 1 to 3 weeks. Autopsies were carried out at various intervals after infection and some animals were used to determine the survival period. The extent of the disease and presence or absence of amoebae were noted in these examinations. A scoring system was devised, similar to that of earlier authors to indicate the extent and severity of the disease and the effect of drugs. Acute ulcerative amoebiasis developed in 80 to 90 per cent. of 217 animals. Diarrhoea with loss of weight began in 4 to 10 days after inoculation and generally persisted till death, mucus and many live amoebae being passed at a later stage, but rarely blood, and cysts were never found. Clean animals housed with those infected failed to acquire the disease. Small ulcers were common at the base of the ileo-caecal valve or appendix and in the caecum these small foci generally coalesced. The average survival period was 15 days. The age of the animal or nature of the diet did not exert a marked influence on the disease. Early and intensive treatment with carbarsone, emetine, aureomycin, terramycin, or diodoquin saved all or a large percentage of animals. Provided that treatment was begun within 4 days after inoculation, the authors consider the rabbit is a suitable host for chemotherapeutic tests in this infection. *J. D. Fulton*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

COLAS-BELCOUR, J., NÉEL, R. & VERVENT, G. Contribution à l'étude de la transmission du spirochète de la fièvre récurrente malgache (*Borrelia duttoni*) par des *Ornithodorus moubata* de même origine. [**A Contribution to the Study of the Transmission of the Spirochaete of Madagascar Relapsing Fever** (*Spirochaeta duttoni*) **by** *Ornithodorus moubata* **from the Same Region**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 69–78. [23 refs.]

The authors summarize previous observations on relapsing fever in Madagascar which would seem to have been identified clinically by DRURY as long ago as the beginning of the 18th century. Previous experiments with *Ornithodorus moubata* collected in endemic areas failed to produce any evidence of natural infection with *Spirochaeta duttoni* and the examination of ticks from 4 additional areas also gave negative results. On the other hand the descendants of these ticks raised in the laboratory were readily infected by feeding them on mice inoculated with a Madagascar strain of *Sp. duttoni*. The infection was transmitted by the bite of the tick and also to the offspring of infected females, since the spirochaetes invaded the eggs in the ovary. The proportion of ticks showing spirochaetes in the coelomic fluid after an infective feed was at least 43·2 per cent. in the authors' experiments, and in the case of adults reached 64·8 per cent. They are of the opinion, therefore, that *Ornithodorus moubata* is responsible for the transmission of Madagascar relapsing fever, and also that the infection may be maintained by the help of (hypothetical) animal reservoirs of which wart hogs, *Phacochaerus*, are considered the most probable.

E. Hindle

ADLER, S., YOELI, M. & MEEROVITCH, E. **A Note on the Action of Terramycin on a Strain of** *Spirochaeta persica* **in Rats.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Mar., v. 46, No. 2, 159–64.

The authors tested the action of terramycin on splenectomized *Bartonella*-free rats infected with a strain of *Spirochaeta persica*. Doses of 20 mgm. or more per kgm. body weight inoculated intraperitoneally cleared spirochaetes from the circulation of infected rats within about 2 hours, but the curative dose was 40 mgm./kgm. No residual brain infections occurred in those animals cured as a result of treatment given while spirochaetes were present in the circulation, although such residual infections are a constant feature in untreated rats. When the disease was allowed to run its natural course such residual brain infections could be cured by doses of 60 mgm./kgm. or more. The administration of doses less than the curative dose immediately before the inoculation of spirochaetes failed to arrest the development of the infection.

Oral administration of terramycin was found to be much less effective than intraperitoneal inoculation, a minimum dose of 200 mgm./kgm. being necessary to obtain a cure.

E. Hindle

HENZE, S. Zur Ätiologie der Rattenbisskrankheit. [**The Aetiology of Rat Bite Fever**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Feb., v. 3, No. 3, 309–13. [22 refs.]

The English summary appended to the paper is as follows :—

"Etiology of rat-bite fever is still open to discussion. Spirillum morsus muris as well as Streptobacillus moniliformis, also called Actinomyces muris ratti, may cause the infection. It is transmitted by rat bite or contaminated food. Literature is reviewed."

LEPROSY

Arcuri, F. & Inzerillo, R. La disprotidemia nella lebbra. Studio elettroforetico del siero nelle diverse forme cliniche di lebbra prima e dopo terapia con tiosemicarbazone. [**The Blood Proteins in Leprosy**] *Acta Med. Italica.* 1952, Feb., v. 7, No. 2, 29–34, 2 figs. [24 refs.] English summary (8 lines).

Using electrophoretic methods, the authors have studied the blood serum in 15 cases of leprosy before and after treatment with thiosemicarbazone. Nine of the cases were of the nodular and 2 of the nerve type, the remaining 4 being mixed. They refer to similar electrophoretic methods having already been used for diagnosis and prognosis and for controlling the results of specific treatment in other infectious diseases. The administration of streptomycin for meningeal and for miliary tuberculosis, penicillin for bacterial endocarditis, antimony tartrate for kala azar has thus been usefully controlled by such methods. The authors summarize the clinical information and the results of laboratory tests in the blood serum after treatment in each case, and before treatment (5 months back) in 10 of the cases.

They found that, before treatment, the total serum protein averaged 7·37 gm. [presumably per 100 cc.], which is in the upper limits of the normal range. The serum albumin, averaging 3·50 gm., tended to be lower than normal. The alpha- and beta-globulins showed some slight increase and the gamma-globulin showed a constant increase. The beta- and gamma-globulins seemed to vary in amount with the type of leprosy. After treatment with thiosemicarbazone, the total serum protein showed a reduction, the serum albumin showed an increase, while the gamma globulin content was definitely reduced, the other two globulins remaining unchanged.

The authors have used a variety of tests to study colloidal resistance in these sera and they report their results.

It is concluded that the changes revealed in the matter of blood proteins result from a non-specific reaction which manifests itself in increased activity on the part of the endothelial reticulocytes and which is not related to antibody formation. *J. Cauchi*

Floch, H. & Nomdedeu, G. Quelques conséquences, en Guyane française, de la sulfonothérapie antilépreuse. [**Some Consequences in French Guiana of Anti-Leprosy Sulphone Therapy**] *Méd. Trop.* Marseilles. 1951, Nov.–Dec., v. 11, No. 6, 921–7.

This is an account of the changes that have taken place between 1946, when sulphone treatment was first introduced, and 1951. At the beginning of the former year there were 210 patients under treatment with chaulmoogra and none with sulphones, in the middle of 1951 there were 602 on sulphones and none on chaulmoogra. So that not only had the sulphones completely replaced chaulmoogra, but the total number under treatment had nearly trebled. The lepromatous patients are divided into 3 categories: very advanced (584 cases), moderately advanced (138 cases), and incipient (99 cases). The percentages with complete disappearance of specific lesions in these three groups are respectively 8, 53 and 66. It is thus clear that in the course of years the contagious cases will disappear altogether. The leprosarium is very old and inconvenient in structure, and also is remote and holds a bad name. For a considerable time the construction of a more suitable institution has been under consideration. The nature of such an institution under these changed circumstances is discussed. More particular consideration will have to be given to rehabilitation and suitable employment of those who have recovered with deformities.

Ernest Muir

GIRARD, G. Les lépreux sont-ils réfractaires à la peste ? [**Are Those with Leprosy Resistant to Plague** ?] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 5/6, 80–83.

For 30 years no case of plague has been known to occur among the 2,000 inmates in the three leprosaria situated in areas heavily affected by plague in Madagascar. The possible influence of special environmental conditions is admitted ; so also is the absence of evidence of resistance to plague among those suffering from leprosy living in their own homes in other countries.

The author refers to experiments in which he found that rats infected with rat leprosy showed a considerable degree of resistance to inoculation with plague ; among 23 such rats 9 showed no ill effects and of the 14 that died 6 had no bacterial infection and were regarded as having died of poisoning by the toxins contained in the inoculum. Among 23 healthy rats inoculated in the same way there was only one survivor. *John W. D. Megaw*

HELMINTHIASIS

HOEPPLI, R. & LI, F. **The Biological and Pathogenic Significance of Helminth Eggs embedded in Tissue.** *Peking Nat. Hist. Bull.* 1950–51, Dec.–Mar., v. 19, Pts. 2/3, 336–61, 12 figs. on 3 pls. [Numerous refs.]

This account is based on observations made on experimentally and naturally infected animals in conjunction with facts already noted in literature and is presented under two headings. In the first of these the biological aspects of eggs in tissues are discussed and are treated as two separate groups, those which normally develop for some time in tissues, such as *Schistosoma japonicum* and *Capillaria hepatica*, and those which are only exceptionally found in tissues, such as eggs of Ascarids, *E. vermicularis* and hookworm. The second part deals with the pathogenic effects of helminth eggs embedded in tissues, either as a normal or abnormal occurrence. Eggs of *Strongyloides*, *Ascaris*, *Paragonimus*, *S. japonicum* and Heterophyid flukes are discussed in relation to tissue changes due to their presence. Ectopic lesions due to eggs of *S. japonicum* and *Paragonimus* are mentioned especially and the physician who works in endemic areas is advised to bear in mind the possible occurrence of such lesions and to suspect them in unusual cases in which the brain is involved. There is a bibliography of 6 pages and the histological appearances are shown in 12 plates. *J. J. C. Buckley*

MACKIE, A. & RAEBURN, J. **Preparation of 2 : 3-Dihydro-3-ketobenzo-1 : 4-thiazine Derivatives as Possible Anthelmintics.** *J. Chem. Soc.* 1952, Mar., 787–90.

SOUTHERN RHODESIA. DEPT. OF HEALTH. Pamphlet No. 13. **How to beat Bilharziasis.** 12 pp., 5 pls. & 2 figs. [1952] Salisbury : Public Relations Dept., Jameson Avenue.

This is a revised edition of the pamphlet reviewed in this *Bulletin*, 1947, v. 44, 1076.

Deslandes, N. Técnica de dissecação e exame de planorbídeos. [**Technique for Dissecting and Examining Snails**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 371–82, 4 figs.

The English summary appended to the paper is as follows :—

" The author describes a method for snail dissection that permits a perfect study of their internal anatomy.

" An iodine solution in 40% alcohol is considered the most suitable way for coloring the prostata and ovotestes so as to permit an accurate study of the necessary details."

McQuay, R. M., Jr. **Susceptibility of a Louisiana Species of *Tropicorbis* to Infection with *Schistosoma mansoni*.** *Exper. Parasit.* New York. 1952, Mar., v. 1, No. 2, 184–8. [14 refs.]

" Thirteen of 131 *Tropicorbis havanensis* from a laboratory colony started from two snails collected at Baton Rouge, Louisiana shed cercariae 22 to 32 days following mass-exposure to a Puerto Rican strain of *Schistosoma mansoni*. This and the *Tropicorbis havanensis* found in New Orleans, Louisiana were both refractory to a strain of *S. mansoni* found in a baboon. The latter colony of *T. havanensis* was also refractory to the Puerto Rican strain. Control snails, *Australorbis glabratus*, invariably became infected when exposed to five or more miracidia of either the Puerto Rican or baboon strain of *S. mansoni*."

Penido, H. M., Pinto, D. B. & Deslandes, N. Observações sôbre as posturas e tempo de evolução de duas espécies de caramujos encontrados no Vale do Rio Doce. [**Observations on the Biology of Two Species of *Australorbis* Found in the Rio Doce Valley**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 407–12.

The English summary appended to the paper is as follows :—

" The authors report certain aspects of the biology of two species of Australorbis found in the Rio Doce Valley in relation to number of eggs, their ability to resist desiccation and number of generations."

Penido, H. M., Pinto, D. B. & Deslandes, N. Estudo comparativo da anatomia interna de caramujos provenientes de Minas Gerais, Bahia, Pernambuco e Pará. [**Comparative Study of the Internal Anatomy of Planorbid Snails from Minas Gerais, Bahia, Pernambuco and Para**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 383–405, 15 figs.

The English summary appended to the paper is as follows :—

" The authors describe the internal anatomy of planorbid snails from localities of the Rio Doce Valley and São Paulo da Mata—Pernambuco, Joazeiro—Bahia and Belém—Pará. They point out two species, one of them closely resembling Australorbis glabratus in accordance with Baker and Scott, which is the species most usually found in the Rio Doce Valley.

" The other one found in Governador Valadares and in the three localities mentioned above seems to be the P. centimetralis of Lutz, however, the authors have not sufficient data available to determine accurately their taxonomy."

PINTO, D. B., ROBERT, C. & PENIDO, H. M. Resultados de experiências com diversos planorbicidas no Vale do Rio Doce. [**Results of Experiments with Different Planorbicides in the Rio Doce Valley**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 357–70, 2 folding maps (1 coloured).

The English summary appended to the paper is as follows :—

" The authors submit results of the experiments carried out in the Rio Doce Valley using various planorbicides.

" These experiments were conducted both in the laboratory and in the field ; in the latter they were made in breeding places with running water and still water, chemical products being used at different concentrations.

" Of all the planorbicides included in the experiments, only the sodium salt of pentachlorophenol at 10 ppm and copper sulphate at more than 30 ppm were capable of causing a hundred percent mortality among planorbid snails.

" The resistance of the ovipositions to the action of the planorbicides, observed in the field, and the capacity of the snails, observed in the laboratory, to oviposit within a minimum of 26 days, account for the need of repeating the treatments at 10 to 15 days intervals, in order to obtain eradication of the species in the breeding places treated."

DA SILVEIRA, S. C. Contribuição ao estudo anátomopatológico do miocárdio na esquistossomose mansoni. [**The Myocardium in** *Schistosomiasis mansoni*] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 559–647, 62 figs. [69 refs.]

This article is divided into 4 parts ; the first is introductory on schistosomiasis in Brazil, associated at times with Chagas's disease ; the second, named historical, giving references to publications on schistosomiasis and myocardial conditions associated therewith. Both these parts are mere compilations with over 50 references. The third part gives an account of the author's own investigations on material sent from different parts of Brazil ; any showing ova or lesions in any organ was subjected to microscopical examination of the heart, portions being taken from different parts for histological examination. Part 4 is a brief discussion of the findings. There are 62 figures reproducing the histological condition of the heart, liver, lung, pancreas and intestine, with ova in the last four.

The myocardial condition may be summed up very briefly : nearly all were normal ; 2 showed some proliferation of the intermuscular connective tissue ; one showed fragmentation of the myocardial fibres and 2 a chronic diffuse myocarditis similar to that of Chagas's disease. There is no mention of the latter infection in the history of these patients but both came from places where Chagas's disease is endemic. *H. Harold Scott*

TANG, C. C., CHOW, C. C., WANG, P. C., SIEH, P. K. & CHOW, S. L. **Epidemiology of Schistosomiasis japonica in Futsing, Fukien Province.** *Peking Nat. Hist. Bull.* 1950–51, Dec.–Mar., v. 19, Pts. 2/3, 226–47, 3 text figs., 1 map & 8 figs. on 2 pls. [Numerous refs.]

" 1. In the present investigation an intensive survey was made to study the distribution of schistosomiasis japonica in Futsing, Fukien Province. The distribution of endemic villages was found to correspond on the whole to the sites where *Katayama* snails were formerly found (Tang 1939). It is also co-extensive with the irrigation system connected with the tributaries of Lung-Su River, which has its outlet to the sea near Futsing town, and of two small rivers draining Yü-Hsi area.

" 2. Stools from 703 persons were examined. 173 of them were found to be positive with ova of *S. japonicum*. The average incidence of infection is 24·4 percent.

" 3. The incidence of infection in different endemic areas was found to vary, 16·8 percent in Kuan-Ying-Buh area, 47·55 percent in Bo-Mei area, 26·31 percent in Dung-Chang area and 12·73 percent in Yü-Hsi area. The conditions of the heavily infected area and the clinical symptoms of the patients are described.

" 4. Age distribution of 173 positive cases was analysed. The highest incidence belongs to the 11–15 age group and the next to the 16–20 age group. A considerable number of children below ten were also found infected. The analysis indicates that in the endemic area, although people acquire the infection at all ages, by far the largest number have their initial infection before they are fifteen years old.

" 5. A few cases of familial infections are reported.

" 6. Epidemiological factors governing the mechanism of infection were studied with special reference to determine the time, environment and mode of infection.

" 7. Field rats, *Rattus losea exiguus* A. B. Howell and *Rattus fulvescens huang* (Bonhote) were found to serve as the reservoir hosts of *S. japonicum* in Futsing.

" 8. Habits and habitats of the snail intermediate host were studied."

RAMAS, R. **Schistosomiasis Research. An Observation.** *J. Philippine Med. Ass.* 1951, Dec., v. 27, No. 12, 751–6.

This is a general account of the activities and findings of an organized schistosomiasis research field unit in an area of the Philippines where *Schistosoma japonicum* infection is endemic. The author praises the fruitful efforts of the Division of Schistosomiasis, and he advocates adequate financial support of the Division with the establishment of a permanent unit in the area under consideration until the disease is eradicated. *A. R. D. Adams*

BUSCH, E. & COOPER, M. **Paragonimiasis : a Case with Metastasis to the Brain. Surgical Removal.** *Acta Med. Scandinavica.* 1952, v. 142, Suppl. 266, 343–8, 3 figs.

" A case of paragonimiasis with a rare complication, metastasis to the brain, has been described. The brain lesion was surgically removed and the diagnosis secured during the operation. Postoperative examination revealed that a complete preoperative history might have suggested the proper diagnosis. It is interesting to note that in this case there was laboratory evidence of pulmonary infestation but a negative chest roentgenogram."

HORNBOSTEL, H. & DÖRKEN, H. Die gezielte Therapie bei *Taenia saginata* (zugleich Prüfung der Atebrin-Wirksamkeit). [**The " Strategic " Therapy of *Taenia saginata* (also Trial of the Efficacy of Atebrin)**] *Deut. med. Woch.* 1952, Mar. 14, v. 77, No. 11, 339–41. [32 refs.]

The drugs used for taeniasis give disappointing results and the authors hoped that aiming low concentrations of a drug at the scolex might give better results. X-ray studies made by PRÉVOT, HORNBOSTEL, and DÖRKEN [this *Bulletin*, 1952, v. 49, 636] on 52 patients had shown that *T. saginata* was situated almost always in the most proximal part of the jejunum at about 50 cm. behind the pylorus. To reach this part of the intestine the authors at first used a

Miller-Abbott sound with a double lumen, the balloon of which permits a relatively rapid passage beyond the pylorus. The drug used was atebrin [mepacrine], which is still little known as an anthelmintic. For this purpose it has the advantage that it is soluble in water and has a strong colour. The authors quote several papers that record its use against tapeworms and *Strongyloides stercoralis*, but it has apparently no action on *Ascaris*. Most authors have given 0·6 to 1 gm. by the mouth in one dose or in doses spread over a few hours. The drug has been given as tablets, in capsules or in oatmeal porridge. The worms were expelled by it up to 8 days after treatment. Its toxicity is known to be slight, but the authors quote papers recording nausea, vomiting, liver damage and other effects of it. Its mode of action on organisms is not known.

The authors localized the tapeworm by X-ray examination and then passed a Miller-Abbott sound to a point 20 cm. behind the scolex. They then introduced 0·8 gm. of atebrin in 100 cc. of distilled water at body temperature above the inflated balloon of the sound ; after half an hour 20 gm. of magnesium sulphate or sodium sulphate was introduced in a 15 per cent. solution ; the former drug may be, they say, toxic or even lethal in higher concentrations. Encouraged by the results of this procedure, they later gave up the Miller-Abbott sound and used instead a simple duodenal sound or the Rehder sound and now they use a D-sound introduced to 70 cm. behind the pylorus, checking its position as much as possible by X-ray examinations.

Treatment of 20 patients, all of whom were males aged 27–74 years, by this method removed tapeworms with their heads 20 times [*i.e.*, presumably from all the patients]. All the patients had had 91 previous unsuccessful treatments. All the worms were expelled *in toto*, so that it was easy to recognize them. Signs of life were often seen in them and this showed that atebrin at first paralyses them. Under favourable conditions it was possible to keep the worms [presumably alive ?], including the head, for 36 hours. They were coloured intense yellow, a fact which indicates that they readily take up the atebrin. An estimate of the atebrin in a worm weighing about 100 g. was 20 mgm. There were no toxic effects on the patients. Serial sections of the scolices showed that they were unaltered, a result at variance with Culbertson's studies of *Hymenolepis nana*, and there was no intestinal epithelium in the suckers of the worms.

Unfortunately the results obtained with women patients were much less successful. Worms were easily and certainly removed, but vomiting was caused, which interfered with the treatment. Prostigmin only occasionally restored normal peristalsis and then the worm was occasionally expelled a few days later. Nausea and vomiting quickly disappeared and after a midday sleep was hardly complained of and the evening meal was taken without disturbance. Alkalis, luminal and other remedies for this typical toxic effect of atebrin did not help these women. Discussing this effect the authors refer to the greater irritability of the vegetative nervous system in women and state that women suffer more than men from tapeworms and that passage of the sounds causes an inclination to vomit more often in females. In all 23 women, aged 18 to 50, were treated and the worms were removed, 12 of them with the head. In many women up to 23 treatments were given and some of the women had carried the worms for more than 20, or even 40, years.

Discussing contra-indications of this treatment, the authors say that they now exclude all women with increased sensibility, bile duct trouble, peptic ulcer or other upper abdominal disease and thyrotoxicosis or pregnancy ; also patients with liver damage and those likely to vomit when the sound is passed. Children must not be given atebrin, although GOODMAN and GILMAN (*The Pharmacological Basis of Therapeutics*, 1949) state that adult doses of it

are harmless to children 8 years old. The authors suggest that, when taeniasis is unsuccessfully treated by other remedies, the worms may have become resistant to the drugs used and they state that they have found that atebrin promptly removes worms that have resisted previous treatments.

G. Lapage

VANDENBERGHE, J. Note au sujet d'un cas de kyste hydatique du foie chez un indigène d'Usumbura. [**Hydatid Cyst of the Liver in an African from the Usumbura Region**] *Ann. Soc. Belge de Méd. Trop.* 1952, Feb. 29, v. 32, No. 1, 109–11.

NEGHME R., A., PILOTTI AVELLO, M. & SILVA C., R. Contribución al estudio de la epidemiología de la Hidatidosis en Chile. [**On the Epidemiology of Hydatid Disease in Chile**] *Rev. Chilena Hig. y Med. Preventiva.* 1951, Sept., v. 13, No. 3, 33–49, 2 figs. [34 refs.]

The main conditions which favour the spread of hydatid disease in Chile are the bad sanitation of most of the slaughter-houses, the number of dogs, especially about these slaughter-houses (though the numbers kept by the people in general are excessive ; in Colliguey there were 390 in 225 houses) ; the inadequate veterinary and medical inspection and control, the number of private slaughter-houses, and the poor or bad water supply.

The authors consider the question under two main sections, animal and human disease. Under the former it is noted that of 127 slaughter-houses only 14 (11 per cent.) have proper enclosures, 11 (8·6) have none at all ; 102 have merely adobe or wood sheds to which stray dogs have easy access. At the time of inspection there were dogs at 79 of the slaughter-houses ; in 110 no attempt was made to reduce rat and fly infestation ; in 66 only was medical and veterinary inspection made, and there was no proper arrangement for disposal of offal. A table presents figures, for 21 towns, of the cattle, sheep and pigs slaughtered in 1950 and the numbers found infected. In towns of the central zone the percentages ranged from 15 to 26 and in the southern between 17 and 86·3 ; of sheep up to 57·2 per cent. of 25,451 in Chillán ; in the southern zone the percentage ranged between 4 and 57 ; of pigs to 84·45 per cent. of 1,396 in La Unión, and varying between 4 and 13 in the north, 1 and 6 in the central and 10 and 84 in the southern zone.

Passing to human hydatidosis, it is seen that infestation has increased in recent years. Though the population has gone up but little in the 6 years 1945–50 inclusive (from 5,392,793 to 5,866,189) the number of cases per 100,000 has been in successive years 3·91, 4·32, 4·68, 4·46, 5·43 and 5·45. For purposes of description the authors divide the country into 5 zones and the prevalence in these varies greatly. In the north, including the provinces of Tarapacá and Atacame, the highest proportion was 2·18 per 100,000 population in 1948, while in 1950 it was down to 0·77 (3 cases only) ; in the zone including Coquimbo and Aconcagua it was highest (4·92 per 100,000) in 1950, lowest (0·84) in 1947 ; in the central zone, from Valparaiso and Santiago to Maule, the prevalence has changed but little, the lowest being 4 per 100,000 in 1946, the highest 5·63 in 1949 ; in 1950 it was 5·20. In the southern zone, between Ñuble and Llanquihue, a cold and moist district with much cattle, the proportion is highest, ranging between 5 per 100,000 in 1945 and 7·53 in 1950.

Altogether, 1,595 cases occurring in the 6 years 1945–50 are analysed and most (209) were in the 21–25-year age-group, 13·1 per cent. of the total, and the 26–30-year age-group was not far behind (12·72 per cent.). But, whereas the records of 10 authors abroad, from Australia, France, Germany, the United

States, Canada, the Argentine, Uruguay and Brazil, records extending from 1894 to 1948, show that the liver was the viscus most affected and the lung only one-fifth to one-tenth of this, in Chile the lungs head the list with 49·3 per cent. of the 1,595 cases, the liver second with 36·49 per cent. Moreover, diagnosis is usually made earlier in Chile ; in more than half the cases within 3 months of the onset of symptoms, whereas the liver hydatid was often not diagnosed until suppuration took place. This early diagnosis of pulmonary hydatid was due in part to the routine X-ray examination carried out before subjects are passed for military service. Fatalities show an almost steady decline, the percentages being 8·53, 5·90, 6·51, 6·72, 5·75 and 4·37 in successive years.

Prophylactic measures will be obvious from a consideration of the causes of prevalence already stated, namely sanitary education on the mode of spread of the infection, treating dogs as dogs and not as intimate friends of the family ; making the slaughter-houses hygienic, control of dogs and preventing them frequenting the slaughter-houses, and proper inspection of abattoirs and prohibition of ill-arranged and ill-equipped slaughter-houses, private or public.

H. Harold Scott

da Costa, O. R., Manceau, J. N., Maroja, R. & de Andrade, G. C. Observações sôbre a ação do hexylresorcinol nas infestações por ancilostomídeos, áscaris e tricocéfalo. [**On the Effect of Hexylresorcinol in Ankylostomiasis, Ascariasis and Trichuriasis**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 465–74. [11 refs.] English summary.

The action of hexylresorcinol varies much in helminthic infestations. In artificial infestation of dogs by *Ascaris suis* complete efficacy, " 100 per cent. removal ", has been reported and the same in cases of human infestation ; in ankylostomiasis, records of 68·5 to 89 per cent. removal have been published ; in *Trichuris* infestation the percentage of removal is " very low ". Lamson *et al.* recorded only 41·4 per cent. among 674 patients treated [this *Bulletin*, 1932, v. 29, 56].

The authors have examined faecal specimens of 209 pupils at a school in Belém, before and after treatment with the drug. For purposes of description the children were divided into 3 groups named homogeneous—including those of the same ages and identical infestations ; complementary—those of the same age but different degrees of infestation, or of different ages but the same degrees of infestation ; heterogeneous—those differing both in age and degree of infestation. [No reason is given for the use of these terms.] The hexylresorcinol was given in dragee form or in gelatin capsules. With the former, to those between 9 and 11 years of age, 6 dragees each of 0·1 gm. were given ; to those between 12 and 14 years 8 dragees, to those over 14 years 10 dragees. The capsules were given as follows : 9–11-year-olds 3 capsules each of 0·2 gm. ; 12–14 years 4 capsules, above 14 years 5 capsules. The previous evening a light meal only was allowed, the drug was taken the next morning before breakfast and no food for 4 hours afterwards ; 12 hours after the drug was taken a sulphate of magnesium purgative was administered.

Tables are reproduced showing the results of the ova found, of each of the 3 species, per gramme of faeces before and after treatment in 87 children. It was found that hexylresorcinol was effective in the treatment of all three forms of infestation and was equally good for ankylostomiasis and trichuriasis, whether in dragees or in capsules. In ascariasis the results were not quite so consistent and further experiments are to be undertaken to determine this or find out the reason for discrepancies.

H. Harold Scott

ENIGK, K. Zur Biologie von *Strongyloides*. [**The Biology of** *Strongyloides*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Feb., v. 3, No. 3, 358–68. [56 refs.]

The English summary appended to the paper is as follows :—

" Transplacentar strongyloides invasion occurs in pigs (Strongyloides ransomi) and nutrias (Strongyloides myopotami) as proved by experiments. When foetuses are invaded three weeks before birth or earlier no strongyloides are found after birth the larvae having perished during the rest of uterine life. Natural immunity prevents strongyloides infection of adult female swine.

" Parasitic strongyloides of pigs and nutrias live in the mucosa of the whole intestinal tract. They are less frequently found in mucous membranes of bronchi, gallbladder, bile ducts, renal pelvis, ureters. Clinical observations reported in literature hint to a similar behavior of Strongyloides stercoralis in humans.

" Occasionally adult round worms are found in autopsies of strongyloides-invaded pigs and nutrias. Some authors consider them males of strongyloides. More probably they are larvae and adults of Rhabditis hominis or related free-living species which enter the host organism through accidental skin lesions. While the majority of Rhabditis worms are promptly ousted from bronchial and intestinal tracts some dead specimens remain in the thoracic and abdominal cavities. Strongyloides ransomi and Strongyloides myopotami are parthenogenetic and do not produce adult males."

HOBSON, A. D., STEPHENSON, W. & BEADLE, L. C. **Studies on the Physiology of** *Ascaris lumbricoides*. **I. The Relation of the Total Osmotic Pressure, Conductivity and Chloride Content of the Body Fluid to that of the External Environment.** *J. Exper. Biol.* 1952, Mar., v. 29, No. 1, 1–21, 3 figs. [23 refs.]

HOBSON, A. D., STEPHENSON, W. & EDEN, A. **Studies on the Physiology of** *Ascaris lumbricoides*. **II. The Inorganic Composition of the Body Fluid in relation to that of the Environment.** *J. Exper. Biol.* 1952, Mar., v. 29, No. 1, 22–9. [25 refs.]

MENDHEIM, H., SCHEID, G. & SCHMIDT, J. Die selteneren Spulwurminfektionen beim Menschen. [**Uncommon Ascarid Infections in Man**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Feb., v. 3, No. 3, 368–71. [27 refs.]

The English summary appended to the paper is as follows :—

" Literature on rare ascarid infections is reviewed. The cat ascarid (Toxocara catis) was found 18 times, the ' leopard ' ascarid (Lagochilascaris minor) 5 times. Only one sure case of dog ascarid infection (Toxicara canis) is on record. One case of calf ascarid (Ascaris vitulorum) is doubtful.

" The author describes a case of Toxocara canis infection as seen in Munich, 1948.

" Rare ascarids are often mistaken for young or male specimens of Ascaris lumbricoides, hence the small numbers reported."

LI, F. **On Two Species of Free-Living Nematodes from Latrines in Peking which may contaminate Improperly Collected Stool Samples.** *Peking Nat. Hist. Bull.* 1950–51, Dec.–Mar., v. 19, Pts. 2/3, 363–73, 17 figs. on 2 pls.

RAGHAVAN, N. G. S. **Filariasis in Porbandar, Saurashtra.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 203–7, 1 map.

"1. Porbandar is a highly endemic filarial town with a low rainfall.

"2. *W. bancrofti* infection only is prevalent, the sole vector of which is *C. fatigans* Wied., 1828.

"3. Filarial disease manifestations were protean in their types.

"4. Results of precipitin tests of blood meals of mosquitoes caught from houses yielded a high percentage of positive reaction against human blood pointing to high potentiality of active transmission of the disease.

"5. Soakage pits in close vicinity of human habitations provide ideal breeding grounds for culicine mosquitoes. These pits have their limited utility, even in comparatively dry regions with fairly absorbent soil. Only properly laid out drainage system is the ideal permanent antimosquito measure.

"6. Danger of passive transmission of filarial infection and infected vectors by coastal traffic is apprehended.

"7. Passive transmission of yellow fever vectors by boats from Africa has to be seriously taken into consideration."

HUGHES, M. H. **Some Observations on the Bionomics of *Simulium damnosum* Theo. in the Southern Gold Coast.** *West African Med. J.* 1952, Jan.–Feb.–Mar., v. 1 (n.s.), No.1, 16–20, 1 graph.

This is an instructive account of the bionomics of *Simulium damnosum*, vector of *Onchocerca volvulus*, studied during 10 months' observations on the Volta, the main river in the Gold Coast. Particular importance attaches to this fly and its control, in view of the scheme to build a dam across the river for the development of a hydro-electric station. Although, when the dam is completed, the breeding places of this fly will be eliminated for about 100 miles above it, there will remain 15 miles to the seaward side where breeding will continue to occur unless control measures are instituted. Two problems are posed : how to protect the labour force working on the dam and how to effect control of the flies from the remaining breeding places once the dam is constructed. The present author is not here concerned with these matters in detail, but accepting that control, indeed eradication, after construction must be attempted, he set out to establish by survey a record of the incidence of the adult flies as a base-line for comparison with observations which would follow any control work in the future.

Fly-boys made day-to-day catches of *Simulium*, and also any other insects that attempted to bite (excluding mosquitoes and *Culicoides*). The list consists of *S. damnosum*, 2 species of *Glossina*, and 5 of Tabanids. The boys could not be supervised regularly but the catches of *G. palpalis* served as a check on the reliability of the boys' records for *Simulium*.

Adult abundance is not simply related to the height of the river ; it is probably a problem involving both the speed of the current and the area of suitable breeding places occurring at different states of flood. A graph shows the density of fly (in flies per 100 boy-hours) in relation to river height (in feet) from October 1950 to July 1951. The river level fell from 53 feet in October to about 43 feet by February. From then until early May it fluctuated slightly but rose again to 45 feet in mid-May ; it fell about a foot in June, and rose to nearly 48 feet about mid-July. *Simulium* adult catches remained below 20 from December to March, having dropped from 160 in October. During April, May and June, separate peaks of about 180, 130 and 90 flies occurred. Densities began rising again in July. Some of these peaks appeared to occur in association with quite small rises in the river level.

Breeding was continuous throughout the year in the lower Volta but in the dry season it was greatly restricted and few adults were caught ; one out of 20 was infected with *O. volvulus*.

In the northern territory the river is dry for many months. It is not known how the fly succeeds in repopulating the upper river when it floods. It may be by invasion from downstream ; some emphasis is given to the possibility of eggs persisting in a viable state throughout the dry season ; dry season survival by adults, pupae, and larvae is thought to be unlikely or impossible.

S. griseicolle breeds in the lower Volta but it has not been found to attack man. The pupal filaments are more cylindrical than those of *S. griseicolle* in the Sudan where this species is a serious pest for man, domestic animals and birds.

D. S. Bertram

Buckley, J. J. C. **Studies on Human Onchocerciasis and *Simulium* in Nyanza Province, Kenya. II. The Disappearance of *S. neavei* from a Bush-Cleared Focus.** *J. Helminthology*. 1951, v. 25, Nos. 3/4, 213–22, 1 map, 4 graphs & 1 pl.

The work reported in the present paper was undertaken before the discovery of the immature stages of *Simulium neavei* [this *Bulletin*, 1951, v. 48, 181] or the successful eradication of this vector elsewhere in Kenya by treating the river system with DDT [*ibid.*, 1947, v. 44, 1084].

A pilot scheme, in which complete clearing of undergrowth and partial clearing of trees was undertaken along the river banks of an area heavily infested with adults of *S. neavei*, gave evidence of an appreciable reduction in the fly population. Control of the fly by similar clearing was then begun in a restricted focus around the trading centre of Riana in the South Kavirondo District of Kenya. The population in this focus was about 800 persons, of whom 21·2 per cent. were infected with *Onchocerca volvulus*. Two rivers, the Riana and the Yabe, run through the infected district. Much of the banks of both rivers was steep, heavily wooded, and characteristic of the terrain associated with the adult flies. Seven catching stations were established on the Riana and three on the Yabe. One collector with human bait visited these stations in turn to collect adult flies between 9·30 and 11 a.m. Periodically, simultaneous collections were made for all the stations, the results confirming those obtained by the rotational visits. The activity of *S. neavei* was shown to be diphasic with a biting peak in the morning and again in the afternoon. The regularity in the hours of collection was, therefore, important.

Sheer felling of all riverine bush was considered undesirable for various reasons, although it was most likely to give a rapid reduction of the fly population. Discriminative clearing, consisting of removing a few trees and cutting out and burning all undergrowth, was adopted. This was completed for the Riana river between February and July of 1943. The results were, when compared with fly incidence on the uncleared Yabe river, disappointing. Further trees were then felled but, in the light of subsequent observations from which it appeared that fly-reduction as a result of clearing was slow, this additional felling was possibly unnecessary. After August 1943, there was an appreciable reduction in fly densities on the cleared Riana river. Clearing of the Yabe began in the middle of 1944. There was, by this time, again a similarity in the fly-densities on the two rivers, suggestive that clearing was proving unsuccessful. The results were particularly disappointing in 1945 after the clearings had been completed on both rivers. But, in 1946 and 1947, fly densities were once more at a low level. Subsequent surveys in 1948 and 1949 failed to find any adults of *S. neavei*.

It is concluded that the bush-clearing was responsible for the eradication of *S. neavei* from the Riana focus but that this field experiment does not indicate the minimum amount of clearing which is required to achieve this end. Clearing has been superseded by the more rapid and less expensive method of treating streams with DDT. *D. S. Bertram*

Ruiz Reyes, F. Datos históricos sobre el origen de la Oncocercoss en América. [**Historical Background of the Origin of Onchocerciasis in America**] *Medicina.* Mexico. 1952, Feb. 10, v. 32, No. 645, 49–56, 2 maps.

Ricci, M. Ricerche parassitologiche nell'Isola d'Ischia. I.—Ricerche con lo " Scotch Cellophane Tape " (metodo di Graham) sulla popolazione infantile. [**Parasitological Study of Children on Ischia Island by Means of Graham's Method**] *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 83–8.

The English summary appended to the paper is as follows :—

" The author has examined using Graham's diagnostic method for enterobiasis 721 children, 407 males and 314 females, whose age ran from over 1 year to 12 years of age, living in five out of six towns of Ischia island.

" On the basis of a single examination, the percentage of infestation by *E. vermicularis* on the total population examined was 30·65%. The frequency of the infestation appeared different in the two sexes (36·62% in females and 26·04% in males) and in relation to age, since it increased along with an increase of age from 1 to 5 years, while it remained constant from 5 years onward. The diffusion of the infestation in the various towns appears practically uniform.

" Moreover, the frequency of findings of *A. lumbricoides* and *T. trichiura* eggs in fecal fragments occasionally collected by the scotch tape has furnished reliable elements for stating that the degree of diffusion of these two parasites in the children of the Island must be very high."

Jírovec, O. Studien über die Verbreitung und Chemotherapie der Oxyuriasis in der Tschechoslowakei. [**Studies on the Distribution and Chemotherapy of Enterobiasis in Czechoslovakia**] *Zent. f. Bakt.* I. Abt. Orig. 1952, Jan. 31, v. 157, No. 7, 539–46. [28 refs.]

So far there have been few papers on enterobiasis in Czechoslovakia. The author briefly summarizes these and gives also a useful bibliography of work done elsewhere. He then records work done since 1948 by himself in collaboration with Rozehnal and Rehnová. For diagnosis the method of Schüffner (*Klin. Woch.*, 1943, v. 22, 521) [see also this *Bulletin*, 1945, v. 42, 922] was used and this method is described. The author considers that it gave results as good as those obtained by Hall's Cellophane tape method or the Brumpt-Jacobs method (no ref.). A table gives the incidence of eggs of *Enterobius* found during the years 1948–50 in 2,452 young schoolboys and 2,494 schoolgirls aged 2–15 and in 567 other males and females aged 15–20 in boarding schools (internate). These 5,513 young people were examined twice. In addition the author examined 320 females aged 18–59 and 280 males and females [presumably adults] who came to gynaecological or dermatological clinics ; these patients usually washed well before attending the clinics and were examined only once.

The smallest incidence was found in Prague, where the incidence in children aged 6–12 was 42–60 per cent., while children of the same age in South Bohemia showed an incidence of 73–79 per cent. and those in the Bohemian Mountains an incidence of 78–87 per cent. Also in the big country towns the incidence was high, reaching 72–84 per cent., which is probably a minimal figure. In

many schools the authors think that 100 per cent. of the children are infected. In country places schools have no washing places, houses seldom have bathrooms and often lack running water. The author's figures agree with those obtained by others.

There were no large or regular differences between the incidences in boys and girls, an average of 58·5 per cent. of girls being infected and an average of 60 per cent. of boys.

Of the patients examined once 58 (18 per cent.) of the 320 women and girls were infected. Among the 280 men and women patients attending the dermatological clinic 66 (23·5 per cent.) were infected. Of the 35 men 12 were positive (34·3 per cent.) ; of the 235 women 54 were positive (22·9 per cent.). This constancy of the incidence in the women is, the author says, surprising. He explains the lower incidence in women by the washing done by them before they came to the gynaecological clinic. Because the patients were examined only once, the figures must be regarded as being minimal and the average incidence in adults must be taken as being about 25–30 per cent. After a second examination the incidence usually rises almost regularly for a further 8–12 per cent.

The relation of age to infection is shown in Table 2. In children aged 3–5 in kindergarten schools the incidence was only 26–41·7 per cent. After passing on to the national schools (*Volkschule*) the incidence rose steeply to 56–70 per cent., reaching 74·7 per cent. in children aged 12. In those aged 14–17 it fell to 64·5 per cent. and in the children older than this to 32, 18, 25 and 20 per cent. After the age of 45 it was only 14·7 per cent. Whether this fall was due to resistance to reinfection, to lack of sufficient numbers of patients for examination or to greater cleanliness of adult women, the author did not determine. Dr. Rehnová examined the finger-nail dirt of 107 kindergarten children and found eggs of *Enterobius* in only 5 (4·6 per cent.) of these children. The author says that this confirms Schüffner's view that examination of finger-nail dirt is not a suitable method for diagnosis of infection with this worm.

Chemotherapy.—After discussing the difficulties of treating this infection and remarking that gentian violet has been almost completely given up in Czechoslovakia, the author gives the results obtained with a combination of phenothiazine 0·25 gm., hexylresorcinol 0·05 gm. and basic fuchsin 0·05 gm., given in the form of a keratin-coated tablet. The following doses were given to children and adults of the ages mentioned :—

Two to three years, 1 tablet morning and evening before food for 2 days ; 4–5 years, the same dose for 4 days ; 6–10 years, 1 tablet morning, midday and evening before food for 4 days ; over 11 years, 1 tablet morning and midday and in the evening 2 tablets, for 6 days ; adults weighing 60–70 kgm., 2 tablets 3 times a day before food for 7–8 days. These doses did not cause any gastric or intestinal symptoms nor any change in the blood ; but the basic fuchsin makes the stools reddish-violet and the phenothiazine may make the urine orange or red. The 37 patients treated were examined before treatment to establish infection and 31 came for subsequent examination 5 or 10 days after treatment and some came for examination several weeks later, 4 men, 9 women and 18 children aged 2–10 years being thus given a complete control examination. Treatment produced no result in 2 men and 3 women, evidently, the author says, because the dosage, which was 20–50 per cent. below that recommended in the literature for each of the constituent drugs of the tablets, was too low. When it was increased by giving the tablets for 8 days complete cure resulted, but chiefly in patients who had previously been treated for a long time with other remedies. The treatment can be repeated after 10–14 days. Frequently it failed and hygienic measures, especially morning and evening washing of the perianal region with running water, were advised, together

with washing the hands before meals and after stools and frequent changes of the personal and bed-clothes. In the stools, 2 to 3 days after the treatment, *Enterobius* are found stained reddish; at first these are alive and later dead, or they may be dead and decomposed. Patients exposed to dust-infection may again become infected. [Some of the author's figures are confusing. It is stated that of 280 patients 12 men out of 35 and 54 women out of 235 were positive. This only accounts for 270 patients. Some of the percentages have also been wrongly calculated.] *G. Lapage*

Brock, N., Erhardt, A. & Wilmanns, H. Zur Behandlung der Oxyuriasis mit Atrimon. (Carbinolbasen des Penta- und Hexamethyl-para-rosanilins.) [**On the Treatment of Enterobiasis with Atrimon**] *Deut. med. Woch.* 1952, Feb. 22, v. 77, No. 8, 240–42. [19 refs.]

After briefly discussing papers recording the testing of remedies for human enterobiasis on rabbits infected with an oxyurid and other literature on this subject quoted, the authors report that their experimental work on rabbits infected with an oxyurid showed that only 3 of the substances tested were both well tolerated and completely effective. These were phenothiazine, N-isoamyl-carbaminic acid- 3 methyl-6 isopropylphenylester and the carbinol base of crystal violet [Atrimon]. The present paper records their work with the last-named of these 3 substances. The greater part of the paper discusses the chemistry of such dyes as gentian violet, crystal violet, methyl violet and malachite green, the relationship of Atrimon to them and the mode of action of the carbinol base which is the element in Atrimon active against *Enterobius*. The desirable properties of anthelmintics are also discussed. The toxicity of Atrimon is low and it can be given in relatively high doses. Clinical trials of it have been done by Reinhard (*Ärztl. Wschr.*, 1950, v. 5, 224), who used low doses and obtained disappointing results. Schmidt and Mendheim (*Münch. med. Woch.*, 1950, v. 92, 624) reported the cure with it of over 71·4 per cent. of children and adults, and after repetition of the treatment they obtained 94 per cent. of cures; but it was not clear whether the controls after treatment were sufficiently thorough.

The authors themselves, following a suggestion made by Schüffner [this *Bulletin*, 1949, v. 46, 858], tried a shortened treatment of 4 days with a daily dose increased to 540 mgm., but they gave up this method, because, although this dose was not toxic, it did not produce the effect desired. Critical analysis of clinical experiments showed, in correspondence with experiments done on animals, to which relatively high doses were given, that the quota of cures obtained with Atrimon depends not only on the dose given, but also on the duration of the treatment. This is probably explained by the work of Enigk (*Zeit. Tropenmed. u. Parasitol.*, 1949, v. 1, 259) and Boeker (*Diss. Münster*, in the press), who showed that the larvae of *Oxyuris equi* and *Passalurus ambiguus* of the rabbit enter the crypts of the intestinal mucosa and there are protected from the action of anthelmintics. The larvae of *Enterobius* may also thus escape and treatment should be prolonged sufficiently to enable it to act on larvae returning to the intestine. It should be given for 7–10 days and repetitions of it will give more certain results. *G. Lapage*

Loughlin, E. H., Rappaport, I., Mullin, W. G., Wells, Helen S., Joseph, Aurele A. & Shookhoff, H. B. **The Treatment of Enterobiasis with Terramycin Base.** *Antibiotics & Chemotherapy*. New York. 1951, Dec., v. 1, No. 9, 588–93. [12 refs.]

The authors briefly review some of the literature on the incidence of *Enterobius* in various countries and a reference to the symptoms of this infection causes

them to say that there are still patients suffering from pruritus ani caused by it who are treated " by radical measures " without thought of the possibility that *Enterobius* is the cause. The authors then comment on the treatment with gentian violet, hexylresorcinol, phenothiazine, lubisan, diphenan(butolan), acranil and egressin. They themselves found that gentian violet and lubisan gave the best results and had " therapeutic effectiveness in the vicinity of 70 per cent." and that the results obtained with diphenan and egressin were " considerably poorer ", while acranil caused intense nausea, vomiting and diarrhoea. They did not try phenothiazine. Anthelmintics commonly used also require special or restricted diets and cathartics or irrigation of the colon.

WELLS [this *Bulletin*, 1952, v. 49, 294] studied the effects of antibiotics on threadworms (*Aspiculuris tetraptera*) of mice and found that terramycin hydrochloride, given for 14 days, beginning two days before, or 7 days after, infection of the mice, reduced the intensity of the infection and caused stunting of the growth of the worms that survived. Worms in treated mice killed on the 28th day had either no eggs or only a few of them and those present which were structurally deformed did not embryonate *in vitro*.

The authors therefore tried the amphoteric form of terramycin (terramycin base) for the treatment of infections with *Enterobius vermicularis* in 30 patients suffering also from yaws. The infections were diagnosed by the Scotch tape method and checked by daily examinations by this method from the first to the 35th day after treatment. Terramycin base was given, in single daily doses according to age as follows : below 5 years, 1 gm. ; 5–10 years 1½ gm. ; over 10 years, including adults, 2 gm. The doses were given for 5 days, but the authors now believe they should have been given for 7 days.

By the 6th day after beginning treatment, *i.e.*, the first day after treatment ended, the examinations of 29 of the 30 patients were negative, while the other case became negative on the 7th day. At 48 hours after starting treatment and thereafter many eggs were immature with tadpole or first-stage larvae ; and the percentage of immature eggs increased daily until none was present ; the degree of immaturity of the eggs also decreased, so that before they disappeared many of them had unsegmented cytoplasm. Eggs that contained tadpole larvae did not develop *in vitro*. Many eggs showed irregular vacuoles between the embryo and the inner membrane of the egg-shell ; these seemed to contain gas and were largest in eggs that appeared to be dead or degenerate. Towards the end of treatment some eggs seemed like hollow shells and were abnormally shaped and contained shrunken, irregular and black embryos. These changes did not occur in eggs obtained before treatment. During 35 daily examinations after treatment no eggs were found in 28 of the patients. In one of the remaining 2 patients one egg only was found on the 13th day after treatment and this contained a fully mature larva ; in the other patient 7 eggs were found on the 30th day after treatment, and all of these were mature. Subsequent examinations of this patient were negative.

The authors could not decide how terramycin acts, but believe that it has some direct action on the mature gravid female *Enterobius* and also on the eggs, probably while they are in the uterus of the worm. The possibility that changes in the bacterial flora caused by terramycin may also operate is being studied. The authors consider that the results they have obtained with terramycin are better than any they have obtained with other remedies for this infection ; it is also not toxic and does not require cathartics, irrigation of the colon or special diets. They point out that treatment should be given to all members of families when one member is infected, even when the other members are negative.

Since this paper was written, the authors have treated 22 other patients in four family groups with terramycin given for 6 days. All the patients were negative " through the thirty-fifth day " after completing treatment.

G. Lapage

DEFICIENCY DISEASES

le Riche, H., Riordan, D., Smit, R., Ockerse, T., Best, P., Kinnear, A. A. & Walker, A. R. P., with the technical assistance of D. du Toit, J. L. Gerdener, J. Seward, L. Steinbach & B. Drysdale. **The Diepkloof Nutrition and Health Study on Bantu Boys, South Africa. Clinical and Dental Examination, Chest X-Rays, Routine Laboratory Examination of Stools and Urine, Haemoglobin and Packed Cell Volume, Tuberculin and Schick Tests.** *South African Med. J.* 1952, Mar. 15 & 22, v. 26, Nos. 11 & 12, 207–12 ; 233–6, 1 fig. [28 refs.]

The South African Institute for Medical Research and the Union Health Department have planned a series of long-term studies on the effects of various simple diets on Bantu boys living in an institution. These two papers describe in great detail the results of the clinical and laboratory findings in 60 apparently normal 14-year-old boys who will take part in these studies. About one-third of these boys had skins which appeared unsatisfactory and about half had signs of chronic cheilosis. There were 5 cases of acute cheilosis. Dental caries, usually involving only a few teeth, was found in about half the cases. Laboratory tests showed that 45 per cent. had intestinal parasites, 13·9 per cent. urinary schistosomiasis and 10 per cent. bacilluria. No case of pulmonary tuberculosis was found.

[This is a very brief summary of the main findings. The importance of the details must remain uncertain until the publication of the effects of the different diets.] *R. Passmore*

Silvera, W. D. & Jelliffe, D. B. **Liver Biopsies in Nigerian Children.** *J. Trop. Med. & Hyg.* 1952, Apr., v. 55, No. 4, 73–9, 5 figs.

The histological picture at liver biopsy in 28 Nigerian children (13 of whom were less than one year old) is described. The characteristic fatty infiltration now well known to be a feature of malignant malnutrition and kwashiorkor occurring in children aged 1 to 5 years was found : it was found not only in children of this age-group, but also in very young babies. Extreme generalized fatty liver changes were found in apparently healthy breast-fed babies. Only two such babies were examined, but in both there was a marked accumulation of fat. If these findings are substantiated, then it is clear that the causes of malignant malnutrition and kwashiorkor extend back in time before the period of weaning, and defects in maternal nutrition will assume a greater relative importance. This is clearly a very practical point. *R. Passmore*

Dricot, C., Beheyt, P. & Charles, P. Contribution à l'étude du Kwashiorkor (Mbuaki du Kwango). [**A Contribution to the Study of Kwashiorkor (Mbuaki of the Kwango)**] *Ann. Soc. Belge de Méd. Trop.* 1951, Dec. 31, v. 31, No. 6, 581–630, 3 pls. [20 refs.]

This paper reviews and summarizes 18 papers published since 1936 concerning the disease known as *mbuaki* in the Belgian Congo. A detailed clinical description together with the laboratory findings of 9 further cases are recorded.

The conclusion is reached that the disease is identical with kwashiorkor as described by GILLMAN, TROWELL and WATERLOW. Alterations in the hair, the eyebrows and eyelashes, irregular skin pigmentation, general apathy, fatty degeneration of the liver, pancreatic deficiency, hypoproteinaemia and retarded growth are constant features. A general diminution of the digestive enzymes with irregular increases in undigested fibre, fat and starch granules in the faeces, a lowered blood calcium, an electrocardiogram with low voltages in the QRS complex and inverted T waves were other common features.

R. Passmore

BERGOUNIOU, J. L. Pathologie comparative des populations de l'A.O.F. Malnutrition et sous-nutrition à Kaolack et Fatick (Sénégal). Nourrissons et jeunes enfants de zéro à quatre ans. [**Comparative Pathology of the Population of French West Africa. Malnutrition and Subnutrition in Kaolack and Fatick (Senegal). Infants and Young Children up to Four Years Old**] *Bull. Méd. de l'Afrique Occidentale Française.* 1951, v. 8, No. 2, 201–19.

This paper describes the clinical condition of children attending 2 hospitals in Senegal. Nine per cent. of infants, who already had teeth but were still partially breast-fed, presented signs of kwashiorkor, and 31·8 per cent. of these infants other stigmata of deficiency diseases. Of the children already weaned 12·5 per cent. presented signs of kwashiorkor and 59·3 per cent. stigmata of deficiency diseases. *R. Passmore*

MASUDA, K. & AOYAMA, J. **Endemic Occurrence of Ariboflavinosis and Pellagra. Clinical Observations of so-called "Shibi" or "Gatchaki" in Tsugaru District.** *Tohoku J. Exper. Med.* 1951, Dec. 25, v. 55, No. 1, 1–5.

"Shibi" and "Gatchaki" are two local names used by the inhabitants of Tsugaru district in Japan describing a "roughness of the skin" and "itching of anal and genital regions". The principal complaints are of lassitude, anal and genital itching, headache and a painful mouth. Glossitis, angular stomatitis, cheilosis, angular blepharitis and anal and genital dermatoses were found in the majority of cases. The greater part of the district is made up of paddy fields with very limited ground available for kitchen gardens and orchards. Snow usually lies from November to April.

[This is a brief paper and the authors have only a very limited access to international, especially African, medical literature. The conditions are clearly similar to other deficiency disease patterns described in Asia and Africa, but whether they can accurately be called either ariboflavinosis or pellagra is uncertain. The combination of a prolonged severe winter and a poor rice diet obviously has interesting nutritional results. Let us hope that this is only a preliminary study and that in due course we hear more about "shibi" and "gatchaki".] *R. Passmore*

HAEMATOLOGY

TASKER, P. W. G. **Anaemia in the Indian Labour Force of some Rubber Estates in Malaya.** *Med. J. Malaya.* 1951, Sept., v. 6, No. 1, 10–14A, 3 figs.

The author investigated the blood picture in 42 cases of anaemia among labourers on rubber estates in Malaya: the haemoglobin percentage, the

packed-cell volume and the red-cell count only were considered. From this he calculated the mean corpuscular volume and the mean corpuscular haemoglobin concentration. The haemoglobin percentages were mostly below 40.

In a previous investigation, the "peak" of the haemoglobin percentage of the whole population of one estate was found to be about 75 per cent. (11 gm. per cent.).

Half the patients were treated with iron by mouth alone and half were treated in addition with crude liver extract—4 ml. on alternate days, folic acid—30 mgm. daily by mouth, or "Vitamin B 20 qg" [whatever it is] on alternate days.

It was observed that there was little difference between the two groups in the rate of increase of haemoglobin, and that in all the tendency of the blood picture was towards a larger cell with higher haemoglobin concentration.

The author concluded that the "nutritional macrocytic aspect" of the anaemia in these patients was minimal and that the macrocytosis was due to blood regeneration.

[The paper is marred by numerous misprints which sometimes obscure the author's meaning.] *L. E. Napier*

Esrachowitz, S. R., Friedlander, S., Radloff, G. & Saunders, S. **The Sickle Cell Trait in Cape Coloured Persons.** *South African Med. J.* 1952, Mar. 22, v. 26, No. 12, 239–40.

The authors, in Capetown, examined the blood of 1,555 "persons who believed themselves to be Cape Coloured and of normal health" by a modification of the method of Williams and Mackey [this *Bulletin*, 1949, v. 46, 774] for detecting sickling.

Conditions of test were identical and there were no doubtful cases. The subjects were working people of 20 to 40 years, with a proportion of females to males of about 10 : 1.

The sickle cell trait was found in 9 (0·58 per cent.).

Reference is made to the observations of Altmann [this *Bulletin*, 1946, v. 43, 372] and Grek and Findlay (quoting Griffith) [below] who found a low incidence in the case of South African Bantu. The present authors point out that the incidence in the Bantu is in fact believed to be higher and that "the present finding of 0·58 of sicklers in Cape Coloured persons can probably only be explained by admixture of Bantu into this people". They point to the desirability of large and efficient surveys for the detection of the sickle-cell trait among the Bantu of South Africa. *H. J. O'D. Burke-Gaffney*

Wyatt, J. P. & Orrahood, M. D. **Massive Fat Embolism following Marrow Infarction in Sickle Cell Anemia.** *Arch. Pathology.* 1952, Mar., v. 53, No. 3, 233–8, 1 fig. [Refs. in footnotes.]

"A case of widespread fat embolism in a 27-year-old parturient Negro woman afflicted with sickle cell disease is reported. Because of the high maternal mortality from such a combination of diseases, it is suggested that the sudden death may be due, in some instances, to widespread fat embolism following marrow infarction."

Cornbleet, T. **Spontaneous Healing of Sickle Cell Anemia Ulcer in Pregnancy.** *J. Amer. Med. Ass.* 1952, Mar. 22, v. 148, No. 12, 1025–6, 1 fig. [10 refs.]

The author, from Chicago, refers briefly to the conflicting opinions recorded in the literature regarding the effects of sickle-cell anaemia and pregnancy

upon each other. Reference is made to the two cases of sudden death in African primagravidae reported by EDINGTON [this *Bulletin*, 1952, v. 49, 176].

After drawing attention to the frequency of ulceration of the leg in sickle-cell anaemia, he records the case of a Negro woman of 20 with this condition. The large ulcer on the ankle resisted treatment for 2½ years, but when the patient became pregnant, healing of the ulcer was rapid and complete. There were no crises, although before pregnancy these occurred about twice a year. Pregnancy and parturition were uncomplicated and immediate recovery was complete. Despite a satisfactory blood picture, however, the ulcer recurred 3 months after delivery, and although great care was taken, it was soon of its previous size. During pregnancy there was no change in the sickling trait which would explain healing of the ulcer, but the general haematological improvement may have contributed to it.

Although sickle-cell anaemia was not in this case " the dire threat in pregnancy that others have found it " the author urges special precautions in obstetrical care and in maintaining the patient's general health and nutrition in such cases. *H. J. O'D. Burke-Gaffney*

GREK, I. J. & FINDLAY, Margaret. **Sickle Cell Anaemia. Report of a Case with a Note on Therapy.** *South African Med. J.* 1951, Oct. 27, v. 25, No. 43, 780–84, 4 figs. [25 refs.]

A case of sickle-cell anaemia in Johannesburg is described. The patient was an African girl aged 17. The father was a Xosa and her mother, now dead, came from Liberia. Her father and a young brother were well and showed no evidence of the sickle-cell trait.

Since the age of 18 months she had had attacks of severe pain in the joints : these attacks usually lasted from 4 to 10 days, but some were of shorter duration, *e.g.*, one night only. They were mainly in the larger limb joints, but she also had pain in the back and abdominal pains, and frequently the latter predominated. At various times diagnoses of subacute bacterial endocarditis, Perthe's disease, an acute surgical condition in the abdomen, and pulmonary tuberculosis had been made.

When first admitted, she was a spindly, long-legged young woman with long hands and feet ; she had a low blood pressure (95/50 mm.), a rapid pulse (150 per min.), and a temperature of 101° to 102·6°F. Her right shoulder was warm and tender, and the movements restricted by pain, she had tenderness on pressure over the sternum and the sacro-iliac joints and pain in the knees but there was no fluid.

" All the vertebrae were osteoporotic ; some of the bodies showed a biconcave deformity (frequently associated with osteoporosis). With the exception of the first dorsal, the vertebrae were relatively shortened in height. The bodies of the fourth and fifth dorsal vertebrae were fused. Localized areas of rarefaction were apparent in a number of vertebrae. There was considerable compression of the posterior part of the body of the fourth lumbar vertebra. These localized areas of absorption were best demonstrated in lateral tomograms.

" A striking feature was the variability in the intervertebral disc spaces. Some were widened centrally and this was secondary to the biconcave deformity of the vertebral bodies. Others showed marked narrowing with irregularity, blurring and slight sclerosis of the adjacent surfaces of the vertebral bodies. These features were most marked in the lower dorsal spine. The articular facets of the paravertebral joints of the lumbar spine appeared narrowed.

" The pelvis was not obviously osteoporotic and coarsening of the trabeculae was not a marked feature.

" The sacro-iliac and the right hip joints appeared normal. The left hip joint showed a coxa plana.

" The long bones showed some encroachment of the cortex on the medulla and a few patchy areas of osteoporosis. There was some coarsening of the trabeculae. There was slight shortening of the left femur, secondary to the coxa plana. The hands and feet revealed arachnodactyly. Coarsening of the trabeculae was apparent in the foot bones. The shape of the skull was normal and the bones did not reveal any obvious changes."

Her blood showed a considerable degree of anaemia (Hb.=8·16 per cent.) with sickle cells in a sealed specimen. The spleen could be felt.

She was re-admitted to hospital 6 times in the next 14 months with similar attacks. Sickling was repeatedly demonstrated and the blood bilirubin rose to 3·2 mgm. per 100 ml.

At the second admission oxygen was given continuously at the rate of 6 litres per minute and nicotinic acid 200 mgm. was given intravenously. She obtained relief immediately after receiving the latter but the effect passed off in the course of time and was not fully maintained by nicotinic acid orally, nor did oral nicotinic acid and ascorbic acid taken regularly prevent recurrences. Arrangements were made with her father, a doctor, for the immediate administration of oxygen when an attack started. The opinion was gained that this mitigated the severity of the attack. *L. E. Napier*

STURGEON, P., ITANO, H. A. & VALENTINE, W. N. **Chronic Hemolytic Anemia associated with Thalassemia and Sickling Traits.** *Blood.* 1952, Mar., v. 7, No. 3, 350–57, 3 figs. [21 refs.]

" The family history, case history and genealogy of a 6 year old girl suffering from a chronic hemolytic anemia is presented. The disease, resulting from her inheritance of both the gene for sickle trait and that for thalassemia trait, is compared to a similar case in a 38 year old male reported by Powell, et al.

" To date the child has had no clinical evidence of an hemolytic anemia, except for an enlarged spleen. Hematologically, however, all findings indicate the presence of a brisk hemolytic process.

" Electrophoretic analysis of the patient's hemoglobin reveals a unique pattern intermediate between the usual sickle cell trait and sickle anemia patterns."

EPIDEMIC DROPSY

CHAUDHURI, R. N. & CHAKRAVARTY, N. K. **Observations on the Toxicity of White Oil.** *Indian J. Med. Sci.* 1952, Feb., v. 6, No. 2, 137–9, 7 figs. on 2 pls.

If the facts recorded in this paper are confirmed, the subject of the causation of epidemic dropsy will have to be reopened and its solution becomes more difficult. Until recently, it was generally believed that epidemic dropsy was due to the adulteration of mustard oil with that of argemone. The authors have set themselves the problem of finding out whether some other adulterant of edible fats and oils might not also be toxic and contribute to the syndrome of epidemic dropsy.

There is a thin, tasteless, almost colourless mineral oil known as " white oil " [its origin or constitution is not given] which, on account of its physical

characters would not be ordinarily recognized as an adulterant. The authors fed monkeys with this oil, 0·5 cc. per lb. body weight, daily. One died at the end of the third week, one on the 11th day ; a third lived for 3 months and was then killed. The amounts given would be equivalent to about 2 oz. of cooking oil for each member of a household. The histological condition of the tissues in the first two were the same as those found in animals fed with argemone oil ; the third showed similar but less marked changes.

The authors conclude " that the tissue changes of argemone poisoning in animals are probably not specific and may be produced by another cheap adulterant, white oil ". This may account for cases of epidemic dropsy in which the history of the recent use of mustard oil cannot be confirmed.

H. Harold Scott

DERMATOLOGY AND FUNGUS DISEASES

EMMETT, J. **Coccidioidin Sensitivity among School Children in Phoenix (Skin Test and X-Ray Survey).** *Amer. J. Pub. Health.* 1952, Mar., v. 42, No. 3, 241–5, 1 fig. [14 refs.]

A survey based on the coccidioidin and tuberculin skin tests and radiological examination of the chest, was conducted on 1,869 schoolchildren aged from 5 to 17 years, in Phoenix, Arizona. Coccidioidin was used at a dilution of 1 : 100 and tuberculin (OT) at 1 : 10,000. Age, sex, nationality, schools attended and length of residence in Phoenix, were factors considered in connexion with the results of the tests.

Of the 1,869 children examined, 794 (42 per cent.) reacted to the coccidioidin test and 312 (17 per cent.) to the tuberculin test. For comparison, the coccidioidin test was applied to 72 adults, of whom 51 per cent. reacted. Radiological examination of the chest was made only on reactors to the coccidioidin test and on 228 non-reactors to serve as controls. Calcified pulmonary lesions were found in 13 per cent. of the coccidioidin-positive children and in 14 per cent. of the 228 negative controls. As lesions were present in 14 per cent. of a group of children who had not reacted to either the coccidioidin or the tuberculin test, the author considered that the lesions in these cases may have been associated with sensitivity to histoplasmin, as some of the children were immigrants from eastern states where histoplasmosis is endemic ; however, no histoplasmin tests were made.

Except for a group of 13 American Indians and Chinese, the children fell into two large groups of Spanish Americans and other white Americans. There was no indication that the reactor rates to the coccidioidin test were influenced by nationality or by sex. The reactor rate appeared to increase with the age of the children, but on careful examination it was seen that this increase was related to the length of residence in Phoenix and, in fact, children of the 5–11 age-group, who had spent their whole lives in Phoenix, compared with those in the 11–17 age-group with the same period of residence in the town. Children who lived in an unpaved and dusty part of the town showed a higher reactor rate than those less exposed to inhalation of dust.

An earlier survey on similar lines in Arizona was reported by ARONSON, SAYLOR & PARR [*Bulletin of Hygiene*, 1942, v. 17, 855] and, following this, EMMONS (*Public Health Reports*, Washington, 1942, v. 57, 109–11) isolated *Coccidioides immitis* from the soil near San Carlos, Arizona, and EMMONS & ASHBURN [*Bulletin of Hygiene*, 1943, v. 18, 385] isolated it from certain species of desert rodents in the same area.

J. T. Duncan

TORRES, C. M., DUARTE, E., GUIMARÃES, J. P. & MOREIRA, L. F. **Destructive Lesion of the Adrenal Gland in South American Blastomycosis (Lutz' Disease).** *Amer. J. Path.* 1952, Jan.–Feb., v. 28, No. 1, 145–55, 8 figs. on 2 pls. [25 refs.]

In contrast with histoplasmosis and some other systemic mycoses in which the adrenals are frequently affected, there are remarkably few reports of involvement of these organs in Lutz's disease (South American blastomycosis). The authors describe the pathological changes in the adrenals in two fatal cases of Lutz's disease in adult males with disseminated lesions. In both cases there was extensive destruction of the adrenal tissue, chiefly in the cortex, by the invading mycotic granuloma and from necrosis.

A new and important observation was the occurrence of emboli of fungal cells, in the circulation, which became impacted in the small vessels of the adrenals. Hyperplasia of the endothelium took place at the site of blockage in the vessel and many of the endothelial cells became multinucleate giant cells in which groups of fungal cells could be seen. The embolus became the focal point of a new granuloma development and the adjacent parts of the blood-vessel showed obliterative endovasculitis.

Necrosis and caseation are usually attributed to local ischaemia or to toxic injury, or to both. In Lutz's disease, however, there is little direct evidence of toxic effects in the granuloma ; indeed, enormous numbers of *Paracoccidioides brasiliensis* may be present in a lesion with no sign of necrosis or caseation. Local ischaemia from pressure of the developing granuloma appeared to be the major factor in causing necrosis, and the embolic occlusion of the small vessels, with the accompanying obliterative endovasculitis, was a contributory factor. Obstruction of the small vessels in the vicinity of the caseous areas could be demonstrated in sections.

The report deals only with the morbid anatomy of the two cases and does not mention if the disease of the adrenals was reflected in the symptomatology.

J. T. Duncan

YOUNG, J. M. & ULRICH, Elizabeth. **Chromoblastomycosis. Report of Case.** *Amer. J. Clin. Path.* 1952, Mar., v. 22, No. 3, 263–6, 5 figs.

"An instance of chromoblastomycosis, the fourteenth from the United States and Canada, and the first from the State of Mississippi is reported. The causative agent was *Phialophora verrucosa*."

TROPICAL OPHTHALMOLOGY

MOLINE, D., TOULANT, P., LARMANDE, A. & TOULANT, M. Les conjonctivites de l'enfance en Algérie. [**Conjunctivitis of Childhood in Algeria**] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 3/4, 37–9.

The acute and chronic forms of conjunctivitis of children were common and more severe in Algeria than in Metropolitan France. Acute conjunctivitis occurred in epidemics and was usually due to the Koch-Weeks bacillus. Owing to the softness of the tissue, children's eyes became more inflamed and swollen with the result that corneal complications were common unless they were carefully treated. In Algeria 15 per cent. of blindness in children was due to Koch-Weeks conjunctivitis. Diplo-bacillary conjunctivitis was uncommon, but the inflammatory signs were more pronounced than in France. It rarely

caused corneal ulceration but was slow and difficult to clear up. Acute follicular conjunctivitis was very frequently seen in children in North Africa and was difficult to differentiate from trachoma. Phlyctenular conjunctivitis occurred in tuberculosis and was often one of the first signs of the disease. Trachoma in children presented a very great social problem. Infection was conveyed from the mother during the first years of life and often by the application of the Kohl stick on the eyes of newborn babies. Owing to the inspection of children's eyes in schools the incidence of trachoma had greatly diminished in the towns, but in Southern Algeria 80 per cent. of Muslim and Jewish children had their eyes affected.

Smallpox, formerly a common cause of blindness, has now become quite rare.

The authors are of the opinion that acute conjunctivitis presents a bigger problem in North Africa than trachoma and point out that greater efforts should be made to protect the eyes of children in Algeria suffering from this disease so that early treatment would be available and residual complications avoided. *E. O'G. Kirwan*

KALL, E. **A Conjunctivitis of Possible Protozoal Origin Occurring in Denmark.** Reprinted from *Acta Ophthalmologica.* 1950, v. 28, No. 3, 409–20, 12 figs.

Between the years 1939 and 1949 particular cases of conjunctivitis were noted which showed a different clinical picture from the usual types. Fifty cases were investigated of which 17 were males and 28 female adults and the age of the patients varied between 15 and 69 years. Five patients were under 5 years of age. The cases occurred during all months of the year. Clinically there was a severe conjunctival injection, a diffuse succulent and more or less follicular swelling especially in the inferior fornix but also in the superior fornix and extending to the tarsal conjunctiva and the margin of the eyelid. Follicles were abundant in the inferior fornix, less in the superior and none in the tarsal conjunctiva. Pannus was only noticed in one case.

The duration of the condition was variable and there were no residual cicatrices. Recurrence occurred in one out of every 5 cases after periods varying from a few months to 2 years.

The nature of the aetiological agent is obscure. The author describes the microscopical findings : the disease is possibly caused by a protozoal agent, and discusses their possible relation to the Leucocytozoon-Haemoproteus group. Further observations are being investigated. *E. O'G. Kirwan*

KALL, E. **A Case of Conjunctivitis Trachomatosa transferred to Mice.** Reprinted from *Acta Ophthalmologica.* 1951, v. 29, No. 1, 103–11, 11 figs.

SINISCAL, A. A. **The Sulfonamides and Antibiotics in Trachoma.** *J. Amer. Med. Ass.* 1952, Feb. 23, v. 148, No. 8, 637–9.

The results observed in a series of 3,500 trachoma patients treated at the Missouri Trachoma Hospital with the sulphonamides and antibiotics are discussed by the author. He considers that the sulphonamides had a specific effect on the virus in trachoma and to date were superior to all other therapeutic agents in the treatment of this disease. Antibiotics were of secondary help in clearing up the associated infections. The treatment carried out at the Missouri Hospital had a three-way attack : (1) Local instillations every two hours of gantrisin 4·3 per cent. solution, daily, for 10 to 21 days ; sodium sulphacetamide, 10 per cent. solution was used instead in some cases ; (2) oral administration of gantrisin in 4 divided daily doses,

according to age and weight for 7 days ; and (3) local application at bedtime of 10 per cent. gantrisin or sodium sulphacetamide ophthalmic ointment during the entire period of treatment. *E. O'G. Kirwan*

HEAT STROKE AND ALLIED CONDITIONS

GRAY, J. A. B. & SMITH, F. E. **Prediction of Thermal Conditions in H.M. Ships in Tropical Waters.** Paper No. 7 read at Inst. of Naval Architects, London, 4th Apr., 1952, 11 pp., 12 figs.

The Royal Naval Personnel Research Committee of the Medical Research Council was asked to define the upper levels of warmth which were compatible with the health and efficiency of men in ships. Such levels were defined in terms of the effective temperature scale, and it was recommended that 80°F. effective temperature should be regarded as the upper desirable limit, and 86°F. as the upper allowable limit.

For the efficient practical application of these recommended values some method is desirable whereby before a ship leaves home waters the thermal conditions which may be expected within mess spaces and other compartments when the ship reaches the tropics can be predicted. Such a method is outlined in this paper.

Observations in ships in the tropics and elsewhere have shown that with constant ventilation the difference between the total heat content of the air of a given compartment and that of the external air is constant. Thus the heat gain within the ship can be predicted from trials carried out in home waters. Hence the wet-bulb temperature in a compartment can also be predicted. The relationship between the dry-bulb and wet-bulb temperatures in a ship happens to be fairly constant, and because of this it is possible to predict what will be the effective temperature within the ship for given external conditions. A nomogram is given by means of which this prediction can be made very simply.

This paper is an important contribution to naval hygiene.

Thomas Bedford

PILLE, G. Essai de physiométrie des climats torrides. [**A Study in Hot Climate Physiology**] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 5/6, 83–8, 3 figs.

While working in the Middle Chad region of French Equatorial Africa, the author decided that, as a means of estimating body heat loss, the effective evaporation of water from lungs and skin could not be accurately determined. He proposes the "basal cutaneous elimination of salt" of a man at rest, obtained with sufficient accuracy by deducting urinary from dietary salt, as a measure of the heat stress imposed by a torrid climate. Under varying thermal conditions there was agreement between hourly sweat salt loss and the magnitude of the corresponding values of the expression

$$t+0{\cdot}12H-37$$

where t=dry bulb temperature and H=relative humidity per cent. The zero value of this expression lay at the threshold of sweating for resting men and if hourly values of the expression were plotted throughout the day an irregular polygon was formed with the straight line $t+0{\cdot}12H=37$ as base. The area of this polygon was called the coefficient of thermal severity of the climate.

The apparatus was simple and the methods easily carried out. The basal elimination of salt gave a guide to the extent of dietary salt supplementation required by hospital patients in the heat. *M. L. Thomson*

Cullumbine, H., Basnayake, V. & Kottegoda, S. R. **A Description of some Effects produced by Residence at Moderate Altitude.** *Ceylon J. Med. Sci.* (Sect. D.) 1951, June, v. 8, Pt. 2, 63–81. [23 refs.]

" Observations made on Ceylonese adults living at moderate altitudes (up to 6,200 feet) indicate that such residence is accompanied by an absolute and a relative lymphocytosis, a leucocytosis, and decreased plasma-, blood-, and tissue-fluid-volumes.

" The experimental evidence indicates that, on travelling from sea-level to an altitude of 6,200 feet, there is first an increase in the activity of the adrenal cortex, with a lessened response to adrenaline, and then a decreased activity, with enhanced responses to adrenaline."

MISCELLANEOUS DISEASES

Misra, S. S. **Infantile Liver Cirrhosis.** *Acta Med. Scandinavica.* 1951, v. 140, Supp. 259, 181–90, 4 figs. [30 refs.]

A series of 97 cases of infantile cirrhosis are analysed.

This disease is widespread in India, but few cases have been reported from the Punjab or Western Pakistan : the present report comes from Lucknow.

The disease is most common among Hindus ; 97 per cent. of this series were Hindus (who form 85 per cent. of the total population of the State). There was a family history of the disease in 81 per cent. of the cases. The disease is more prevalent among the middle and higher income groups of the population. Over 80 per cent. were boys and 77 per cent. were between 1 year and 2 years of age ; only 8 per cent. were above 2 years and only 1 above 3 years.

All but 6 per cent. were still on the breast but only 16·5 per cent. did not receive some supplementary diet.

In only 7 per cent. was there no history of significant illness, chest trouble or diarrhoea with or without blood and mucus.

In 13 cases the onset was " explosive " and 9 of these patients died ; there was fever with rigor, vomiting, a large liver and jaundice and the condition suggested a virus hepatitis. In the rest the onset was insidious ; the cases are divided into three stages, the early—21 cases, intermediate—44 cases, and " terminal "—19 cases.

In the early stage the child was " off colour " and irritable ; it had a capricious appetite and the bowels were irregular, and the stools copious and occasionally clay-coloured. All were under weight and had enlarged hard livers and 18 had a microcytic anaemia. The spleen was not enlarged in any case, and no liver function test was done.

In the intermediate stage additional constant symptoms were distended abdomen, fever, and attacks of diarrhoea. The liver was hard and nodular and reached a greater size—up to 7 fingers' breadth below the costal margin, the spleen was enlarged and enlarging, the anaemia was more prominent and liver function tests were positive.

In the terminal stage there was in addition general anasarca, ascites, jaundice, and haemorrhages from the nose and rectum. The liver had now begun to shrink and the spleen was 4 to 5 fingers' breadth below the costal margin. The liver function tests showed gross damage and a polymorphonuclear leucocytosis was present.

In the first stage all the patients recovered and those in the terminal stage all died, whereas in the intermediate stage 5 out of 44 died. [This sharp division in prognosis suggests either that the treatment is very effective or that the division of the cases was influenced by the final result.]

The treatment included active measures to control any infections. The diet given was high in protein and low in fat, and was supplemented by casein hydrolysate, proteolysed liver extract and a multivitamin mixture. A bile-salt preparation, glycerin pepsin and an iron mixture were prescribed.

L. E. Napier

DE LAJUDIE, P., PORTE, L. & BRYGOO, E. R. Sur un cas de kala-azar et de mélioïdose observé en Indochine. [**A Case of Kala Azar and Melioidosis seen in Indo-China**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 45–8.

The following is a translation of the authors' summary :—

A case is reported of a patient suffering simultaneously from kala azar and melioidosis. The first signs appeared 4 months after the patient had left North Africa : it would thereafter appear to be either an autochthonous case—the first seen in Indo-China—or more probably a case with a prolonged incubation period. *H. J. O'D. Burke-Gaffney*

BRYGOO, E. & DE JAUREGUIBERRY, P. Un cas de mélioïdose pulmonaire. [**A Case of Pulmonary Melioidosis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 62–9, 1 fig.

The following is a translation of the authors' summary :—

A case is described of pulmonary melioidosis which appeared suddenly in a healthy young man : it was treated with antibiotics. *Pf. whitmori* was isolated first by blood culture and later, on two occasions, from the sputum : on the first occasion, it was associated with *Ps. pyocyanea*. Later a high titre of agglutination of *Pf. whitmori* was detected in the patient's blood.

H. J. O'D. Burke-Gaffney

BORGERS, G. Notes statistiques et cliniques sur le cancer à Coquilhatville. [**Statistical and Clinical Notes on Cancer at Coquilhatville**] *Ann. Soc. Belge de Méd. Trop.* 1952, Feb. 29, v. 32, No. 1, 11–17.

COSTA, J. A. **Tick Paralysis on the Atlantic Seaboard. Study of Incidence during Poliomyelitis Season with Report of a Case and Review of Published Cases.** *Amer. J. Dis. Children.* 1952, Mar., v. 83, No. 3, 336–47, 3 figs. [Refs. in footnotes.]

[This is a most interesting, detailed and well-documented account of tick paralysis and its possible confusion with acute anterior poliomyelitis.] In the United States west of the Rockies tick paralysis is associated with *Dermacentor andersoni*, the wood tick ; in the eastern States and particularly the Atlantic sea-board, with the dog tick, *D. variabilis*. Long Island and Cape Cod, places with high humidity, are much affected. The tick attacks sheep, foals, calves and dogs as well as man, especially children. The toxin is excreted by the females when ovipositing, especially a day or so before they drop off after the average 6½ days' engorgement and the toxin appears to be produced or concentrated in the ova. Implication of a male tick reported by BOW and BROWN is referred to by the author but has not been confirmed by others. [The paper referred to was abstracted in this *Bulletin*, 1946, v. 43, 327, but this point is not mentioned in this abstract.] The ticks abound at the edges of paths and attach themselves immediately to a passing host. The tick season is from

March to August, the peak infestation being May–July, which happens also to be the poliomyelitis season, and, seeing that bulbar paralysis may occur in both, that either may be rapidly fatal, but that, if the tick be discovered and removed, recovery is rapid, diagnosis is all-important.

The symptoms and course of the disease are well illustrated by a case described in which a girl of 3½ years had fallen down a bank and struck her head ; she vomited once afterwards. Two days later—nothing abnormal had been noticed in the interval—she woke up with headache and pain behind one knee and when she tried to get up she fell owing to weakness of her legs. Examination, on her admission to hospital, revealed difficulty in holding up her head (no nuchal resistance or rigidity), deep reflexes absent, flaccidity of trunk and leg muscles, well described as " rag doll " paralysis, for the head could be flexed to touch the toes, and arms and legs were flaccid. An engorged tick was found in the left temporo-frontal region the next day and removed. Respiration was normal but there was loss of speech and pharyngeal paralysis. Symptoms progressed for a few hours and a respirator was in readiness and oxygen was administered, but in another 8 hours improvement began ; in 24 hours reflexes were returning and in another 2 days recovery was complete. The child had a dog, as had several of her neighbours. [Whether the tick settled on the child when she fell or came from the dog is not considered.]

It is surprising that more children and dogs are not attacked ; it is suggested that there may be individual susceptibility to the specific neurotropic toxin of the tick. The importance of examining children periodically for ticks is stressed ; people conscientiously examine their dogs and remove attached ticks, but do not bother to "detick" their children, at any rate to look for them. The author in his summary indicates from this case of rapidly ascending paralysis of the Landry type with loss of speech and difficulty of deglutition, pointing to cranial nerve involvement, that *D. variabilis* is every whit as toxic as *D. andersoni*, contrary to the common notion that the latter is the more toxic. He adds " Recognition of the disease early is essential to save life. Its incidence during the summer months coincides with the poliomyelitis season; differential diagnosis is imperative, since removal of the tick produces dramatic improvement even when bulbar paralytic symptoms have appeared."

H. Harold Scott

PROTOZOOLOGY : GENERAL

Manwell, R. D. & Drobeck, H. P. **Mammalian Toxoplasmosis in Birds.** *Exper. Parasit.* New York. 1951, Oct., v. 1, No. 1, 83-93, 2 figs. [15 refs.]

This is an experimental study of natural toxoplasmic infection in birds, of their experimental infection with mammalian toxoplasms, and of the effect of different temperatures on these parasites. In the case of large birds (pigeons), natural infection was determined by the dye-test and, in the case of smaller ones, by sub-inoculation of mice. For experimental infections a human strain of *Toxoplasma* in mice was used. For this purpose the peritoneal exudate or an emulsion of brain tissue from infected mice were inoculated intraperitoneally or intracranially into the birds. Experimental infections were carried out in chickens, pigeons, grackles (*Quiscalus q. quiscala*) and song sparrows (*Melospiza m. melodia*). The effect of temperature was tested by keeping infected mouse brains in the refrigerator and by placing the peritoneal exudate from infected mice in a water bath.

Natural infection was detected in a wild pigeon. Among the birds inoculated with human toxoplasms, some acquired an acute fatal infection, others a chronic symptomless infection. The mammalian parasites underwent no changes in most of the avian hosts, but in chickens their virulence was diminished. In grackles parasitaemia was demonstrable for 5 days, during which 0·1 ml. of their blood infected mice. Two young pigeons, which were fed by a mother suffering from acute toxoplasmosis, did not become infected but, when subsequently inoculated with the parasites, they were shown to be susceptible : the infection ran a chronic course with antibodies demonstrable for 6 months. As regards the effect of temperature, the parasites remained viable after storage in the refrigerator for 18 days, while exposure to 50–55°C. for 5 minutes was lethal to them.

The results of experimental infection of birds with mammalian toxoplasms indicate that these animals may also serve as reservoir hosts of human infection.

C. A. Hoare

GIROUD, P. & GAILLARD, J. A. Culture des toxoplasmes dans le poumon de lapin. [**Cultivation of Toxoplasms in Rabbit Lung**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 540–42, 4 figs. on 2 pls.

In view of the susceptibility of rabbits to toxoplasmic infection and with the object of producing large quantities of antigen, the authors attempted to cultivate the parasites in the pulmonary tissue of this animal. For this purpose, the peritoneal cavities of infected mice were washed with heparinized saline, and 8 cc. of the fluid were injected into the trachea of a rabbit. The infection ran an acute course terminating in death on the 5th day. At autopsy the lungs were found to be hepatized and oedematous, filling the entire thoracic cavity. Histopathological examination revealed bronchopneumonia, characterized by interstitial inflammation, with accumulations of reticulo-endothelial cells between the alveoli. The latter were affected by oedematous or catarrhal alveolitis. Toxoplasms were present in large numbers within the large alveolar cells and outside the tissues, the density of the infection being comparable to that in the peritoneal exudate of infected mice. It is concluded that induced pulmonary infection by the tracheal route provides a means for studying the development of the parasite and an easy method for producing large quantities of toxoplasmic antigen. The histopathological changes in the parasitized lung are illustrated by photomicrographs. *C. A. Hoare*

WILDFÜHR, G. Über den Erregernachweis und die serologischen Reaktionen bei Toxoplasmose. [**Detection of the Causative Organism and the Serological Reactions in Toxoplasmosis**] *Ztschr. f. ärztl. Fortbildung.* 1951, Dec. 15, v. 45, Nos. 23/24, 644–6, 3 figs.

This is a critical review of the present state of knowledge regarding the aetiology and diagnosis of toxoplasmosis, with special reference to the detection of the parasites and the demonstration of antibodies.

The toxoplasms can be detected by intracerebral or intraperitoneal inoculation of material from suspected human cases into mice or hamsters, from which a second passage is sometimes made.

A description is given of the serological methods in common use. In assessing their relative diagnostic value, the author points out that (1) the rabbit-skin neutralization test has been superseded by more reliable methods, (2) the dye-test is effective but difficult to perform and expensive, (3) the complement-fixation test produces variable results. Moreover, all the serological tests may be negative in cases of undoubted infection and may also produce non-specific reactions.

It is concluded that a serological reaction alone cannot be relied upon for the diagnosis of toxoplasmosis. But in conjunction with clinical symptoms, it provides confirmatory data of an infection or of the results of treatment.

C. A. Hoare

KÅss, E. & Steen, E. **Serological Investigations of Rabbits experimentally infected with** *Toxoplasma gondii*. Reprinted from *Acta Path. et Microb. Scandinavica*. 1951, v. 28, No. 2, 169–73.

"Rabbits suffering from acute toxoplasmosis produce specific antibodies against Toxoplasma gondii. Complement fixing antibodies appear in the serum during the second week of infection and reach a level of 1 : 384 after four weeks. The majority of untreated rabbits die before the complement fixation test becomes positive. Dye test is more sensitive, and measureable amounts of antibodies could be demonstrated already on the 4th day. Dye test reached a maximum titer of 1 : 81920 during the 4th week. The hyperimmune sera exhibited a prozone phenomenon in that the 1 : 20 and sometimes 1 : 40 serum dilutions gave negative readings. There was good correlation between dye test and complement fixation test."

KÅss, E. & Steen, E. **Aureomycin Treatment of Acute Experimental Toxoplasmosis in Rabbits.** Reprinted from *Acta Path. et Microb. Scandinavica*. 1951, v. 28, No. 2, 165–8, 1 fig.

"12 rabbits were inoculated intraperitoneally with Toxoplasma gondii. 6 were treated with aureomycin, the other 6 served as controls. 5 of those treated survived, but only one of the controls. Sera from the surviving animals gave strongly positive complement fixation and dye test."

Sapero, J. J., Lawless, D. K. & Strome, C. P. A. **An Improved Iodine-Staining Technique for Routine Laboratory Diagnosis of Intestinal Protozoa.** *Science*. 1951, Nov. 23, 550–51.

This is a description of a simple and rapid staining method for protozoa in faecal specimens, said to be superior to all other techniques, including haematoxylin staining.

The solution ("MIF") has the following composition :—

0·10 ml. Lugol's iodine solution (Merck Index).
0·15 ml. Formaldehyde (USP).
0·75 ml. Tincture merthiolate 1 : 1000 (Lilly).

The mixture is placed in a stoppered Kahn tube, where it can be kept up to 8 hours, after which it deteriorates and should be discarded. The iodine solution should also not be used for more than a week.

The faecal preparation is made as follows : on one end of a slide a small amount of faeces is teased up in a drop of saline ; on the other end is placed a drop of distilled water (half the size of the saline drop), to which a similar drop of "MIF" is added, after which a sample of faeces is teased up in this fluid. Finally coverslips are placed over the saline and "MIF" preparations, and both are examined microscopically.

"MIF" stains both the trophozoites and cysts of the intestinal amoebae and flagellates, revealing in them all structural details of diagnostic value. In trophic amoebae the cytoplasm is first yellow, then salmon pink, while the nuclear elements are coloured from brown to black. In flagellates the

individual flagella are visible. In the case of cysts, the staining of the cytoplasm is variable, but the diagnostic features—nuclei, chromatoids, glycogen, etc.—are clearly revealed. *C. A. Hoare*

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Robinson, G. G. **Mosquitoes caught in Northern Rhodesia at Balovale and Livingstone.** *J. Entom. Soc. Southern Africa.* 1948, v. 11, 63–7. [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Feb., v. 40, Pt. 2, 24.]

A list is given of 16 species and varieties of *Anopheles* and 62 mosquitos of other genera taken at Balovale and Livingstone, Northern Rhodesia, including 15 previously recorded at Livingstone by Muspratt, with very brief notes on the distribution of breeding places of a few of them and descriptions of the larva and adults of both sexes of *Aëdes wellmani* (Theo.).

Deane, L. M. & Candau, M. G. Anofelinos encontrados no Município de Petrópolis, Estado do Rio de Janeiro. [**Anophelines Encountered in the County of Petrópolis, Rio de Janeiro State**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1951, Apr., v. 4, No. 2, 413–22, 1 map. [13 refs.]

The English summary appended to the paper is as follows :—

" A survey of Anopheline mosquitoes was made from March 7 to May 12, 1950 in the county of Petrópolis, State of Rio de Janeiro, Brazil.

" The ten following species were found : *Anopheles intermedius, A. fluminensis, A. pseudotibiamaculatus, A. argyritarsis, A. noroestensis, A. strodei, A. lutzi, A. parvus, A. antunesi* and *A. cruzii.*

" The geographical distribution of each species within the county is given in two Tables and one Map. None of the mosquitoes is suspected of being a local malaria vector.

" Petrópolis is the sixth locality and Rio de Janeiro the third State of Brazil, where the relatively rare *Anopheles pseudotibiamaculatus* has been encountered."

Gillett, J. D. **The Larva, Pupa and Adult Male of** *Aëdes* (*Stegomyia*) *ruwenzori* **Haddow and van Someren (Diptera, Culicidae).** *Ann. Trop. Med. & Parasit.* 1951, Dec., v. 45, Nos. 3/4, 195–8, 1 fig.

" Descriptions are given of the larva, pupa and adult male of *Aëdes* (*Stegomyia*) *ruwenzori* Haddow and van Someren, a new species of mosquito recently taken in the mountain forest of the Ruwenzori mountains in Uganda.

" Certain similarities of *A. ruwenzori* to *A. africanus* and *A. bambusae* are noted.

" *A. ruwenzori* reared through to the next generation at temperatures higher than that of their mountain habitat remained typical in ornamentation, while *A. africanus* reared at low temperatures differed in no respects from their batch-mates reared at higher temperatures. It may be concluded that the difference between these two species is genotypic in origin, and not merely a phenotypic effect due to the conditions of high altitude."

Rosen, L., Reeves, W. C. & Aarons, T. *Aëdes aegypti* **on Wake Island.** *Proc. Hawaii Entom. Soc.* 1948, v. 13, No. 2, 255–6.

Colless, D. H. **New Methods for mounting Mosquito Larvae.** *Indian J. Malariology.* 1951, June, v. 5, No. 2, 183–6.

Holway, R. T., Mitchell, W. A. & Salah, A. A. **Studies on the Seasonal Prevalence and Dispersal of the Egyptian Housefly. I. The Adult Flies.** Reprinted from *Ann. Entom. Soc. of America.* 1951, v. 44, 381–98, 8 figs.

With the use of the Scudder fly-grill for estimating fly density a study was made of the prevalence of adults of *Musca domestica vicina* in selected villages in Egypt during different seasons of the year, and of their daily activity and distribution indoors and outdoors.

Fly density is lowest in December to February when mean temperatures are lower than 15°C. There is a rapid increase in the numbers in March which attains its maximum in June. Increasing density occurs when the mean temperatures are between 20°C. and 25°C., but mean temperatures over 25°C. result in diminishing abundance. This leads to a fall in the numbers of adults during the hot months of July and August. As mean temperatures fall below 25°C. in September there is a secondary peak in fly density which, however, never attains the numbers of the spring population, and finally diminishes to the low densities of the cooler months of the winter.

The daily activity and distribution of flies depends closely on temperature. Regardless of attractive foci, they tend to concentrate in warmer sites when air temperatures are below about 20°C., and, conversely, concentrate in cooler places as air temperatures rise over 30°C. An air temperature of 25°C. appears to be critical in initiating their movements in and out of buildings. Despite open doors and windows the indoor temperatures are less extreme than outdoor air temperatures. When the latter rises over 25°C. flies begin to be relatively more abundant indoors. Below 25°C. the outdoor counts continue relatively greater than those indoors. The movement indoors is probably partly influenced by attractive foci of food to which flies respond quickly in air temperatures between 25°C. and 30°C.

In the late afternoon there is a general fall in fly counts regardless of temperature ; this is attributed to the approach of sunset and the retreat of house-flies to night resting-places.

The implications of fluctuating fly distribution between indoors and outdoors in the choice of time for the application of anti-fly sprays (other than indoor residual treatments) are discussed. *D. S. Bertram*

Gaud, J., Maurice, A., Faure, P. & Lalu, P. Expériences de lutte contre les mouches au Maroc. [**Methods of Fly Control in Morocco**] *Bull. Inst. Hyg. Maroc.* 1950, v. 10, Nos. 1/2, 55–71, 5 text figs. & 2 figs. on 2 pls.

Control of flies [presumably *Musca domestica*] by residual deposits of DDT on the walls of the houses of isolated communities in Morocco proved too expensive for adoption as a standard procedure. Field tests were carried out of other methods of control which would be more economical. Aerial spraying of benzene hexachloride at a dosage of 20 kgm. per hectare over the whole environs of a village area gave temporary reduction at a cost as low, in one test, as 6 francs per inhabitant per treatment. Insecticidal mists dispersed from ground vehicles every 10 days are thought to be more suitable means of treatment (as at Casablanca). In another area regulations were enforced for better disposal

of waste and sewage and contact insecticides were sprayed weekly around latrines, manure heaps, and waste trenches. The results were very satisfactory, but it was not easy to obtain the co-operation of the inhabitants who resented the alterations in their ways and customs. It is noted that the readiness with which flies develop resistance to insecticides indicates that improved sanitary conditions should be encouraged among the peoples of rural communities in Morocco.

There was evidence of a reduction in the incidence of inflamed or suppurative eye conditions, particularly in children (88 per cent. affected in an untreated area ; 36 per cent. in a treated district) following a reduction in the fly population.

One of the plates is an excellent photograph showing the indifference of a child to flies swarming on its head and eyes, and over its nostrils and mouth.

D. S. Bertram

HADDOW, A. J. **Further Observations on the Biting-Habits of Tabanidae in Uganda.** *Bull. Entom. Res.* 1952, Jan., v. 42, Pt. 4, 659–74, 3 figs.

An account is given of the biting habits of *Chrysops centurionis* which was taken consistently during systematic catches of mosquitoes in field researches on yellow fever vectors in Uganda.

C. centurionis bites little during the day, but has a marked peak of biting activity in the hour immediately after sunset (18 hours ; 6 p.m.). On some days biting activity may begin an hour earlier or later ; there is a tendency in the former case for the peak period in the hour after sunset to be less marked, and, in both instances, biting-intensity may continue quite high for some hours during the night.

In the tropical rain forest at Bwamba, *C. centurionis* bites predominantly in the forest canopy during the rains but more commonly in the understorey in the dry season. It has rarely been taken at ground level (50 specimens at ground level as compared with nearly 3,000 at the higher levels in the trees in collections made over about 6 years). A similar vertical distribution was found to occur in lighter rain forest near the shores of Lake Victoria at Entebbe ; this distribution did not vary with day and night.

C. centurionis occurs throughout the year but is most prevalent between April and July, during the main rains.

It is noted in discussion that *C. centurionis*, like *C. silacea* and *C. dimidiata*, the vectors of loiasis in West Africa, is mainly arboreal but that it is, unlike these diurnal vectors, crepuscular in its activity. It may be a vector of monkey filariasis which is common in Uganda forest monkeys. Since, however, *C. centurionis* rarely leaves the upper reaches of the forest foliage it seems unlikely that it could, as may be the case for *C. silacea* and *C. dimidiata*, act as an intermediary for the transmission of monkey filarial infections to man [this *Bulletin*, 1950, v. 47, 1231]. Even when there are clearings in the forest, *C. centurionis*, in contrast to the West African vectors, does not leave the canopy or understorey ; it is not known to enter houses. Finally, it is chiefly active after dark when Africans rarely frequent the forest.

Haematopota nefanda, a scarce forest species, exhibits two periods of biting activity. In one the peak of activity occurs in the hour before sunrise ; the other occurs late in the afternoon with a moderate peak one to two hours before sunset. Microclimatic factors differ sharply in these two periods of the day. It is postulated that each peak is composed of individuals in some particular physiological phase which affects their responses to environmental factors.

There are brief notes on other Tabanidae, 13 spp. of *Tabanus*: 9 spp. of *Haematopota*; 1 sp. each of *Hippocentrum* and *Tabanocella*; and 5 spp. of *Chrysops*. *D. S. Bertram*

Pick, F. L'observation d'un syndrome cutané dû aux morsures de *Trombicula autumnalis*. [**Cutaneous Lesions Caused by Bites of** *Trombicula autumnalis*] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 1, 60–62.

Cutaneous lesions accompanied by black discoloration of subcutaneous tissue and the presence of a histiosiphon are described from cases observed in north Holland during the summer of 1941 and 1942. The chelicerae of mites, reported to be *Trombicula autumnalis*, were found in sections of the lesions. It is noted that the reaction to the attachment of the mites resembles the eschar of tsutsugamushi fever; similar reactions may have followed in the present cases the inoculation of non-pathogenic rickettsiae. *D. S. Bertram*

Théodorides, J. Notes sur des Coléoptères d'importance médicala. (Première série.) [**Notes on Coleoptera of Medical Importance**] *Méd. Trop.* Marseilles. 1951, May–June, v. 11, No. 3, 512–24. [53 refs.]

This is an account of the medical interest of over 40 species of beetle, representative of 12 families of the order Coleoptera. Minor or severe vesicant effects are associated with contact with some of the species; antibiotic substances affecting various bacteria have been extracted from several species of *Brachynus*; hyper-sensitivity to contact with infestations of Dermestid beetles is recorded and an instance reported in which the time of death of human corpses was estimated from the infestation of *Dermestes frischii*; certain of the records are merely for species of beetles which succeeded in biting firmly with their mandibles when handled. *D. S. Bertram*

Jones, L. R. & Riddick, J. A. **Separation of Organic Insecticides from Plant and Animal Tissues.** *Analytical Chemistry.* 1952, Mar., v. 24, No. 3, 569–71. [12 refs.]

Feinstein, L. **A New Reaction and Color Test for Allethrin and Pyrethrins.** *Science.* 1952, Feb. 29, 245–6.

Hoskins, W. M., Witt, J. M. & Erwin, W. R. **Bioassay of 1,2,3,4,5,6-Hexachlorocyclohexane (Lindane). Some Factors influencing the Contact of Chemical and Test Insect and Methods for standardizing the Process.** *Analytical Chemistry.* 1952, Mar., v. 24, No. 3, 555–60, 2 figs.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

Dean, R. F. A. **Observations on African Children.** *East African Med. J.* 1952, Jan., v. 29, No. 1, 1–6.

This lecture to the Uganda branch of the B.M.A. covers, for the most part, familiar aspects of kwashiorkor. The "feminization" of African boys is, however, stressed. In one school out of 180 boys examined, 6 had a considerable degree of gynaecomastia: boys of 18 years had little hair on their face. The normal sex differential in the development of the epiphyses and carpal bones was absent. In particular "in the second metacarpal bone which normally

shows well-marked differences in the two sexes, we found in the boys the shape and proportions we expected in girls ". Details of technique and results are not given. There are, however, some interesting, but as the author admits " quite unsubstantial " speculations about the African reacting abnormally to stress by an overproduction of some steroids, which may be responsible for an intersexuality.

[Dr. Dean has recently gone to East Africa with a Medical Research Council Unit, from the Department of Experimental Medicine, Cambridge. He has been rushed into print rather quickly, but we can clearly look forward to some interesting papers from him about the development of African children and their normal physiology.] *R. Passmore*

VAN OYE, E. & CHARLES, P. Contribution à l'étude de la fonction hépatique chez le noir africain. IV. Protéines sériques et tests hépatiques. [**Study of Hepatic Function in Africans. IV. Serum Protein and Hepatic Tests**] *Ann. Soc. Belge de Méd. Trop.* 1951, Dec. 31, v. 31, No. 6, 701–19, 1 chart.

Blood sera were examined by the following hepatic tests : (1) Cadmium sulphate reaction of Wuhrmann & Wunderly ; (2) Cephalin-cholesterol test of Hanger ; (3) Distilled water test of Vincent & Girard ; (4) Thermo-coagulation test of Weltmann ; (5) Lugol test of Mallen *et al.* ; (6) Thymol test of Maclagan ; (7) Classical Takata reaction. The technique of each test is described and the significance and interpretation is discussed in relation to the protein fractions of the blood.

The different protein percentages and the results of the 7 tests are tabulated for 600 Africans from Léopoldville. Although the subjects were apparently in good health, they almost all showed a positive reaction to one or more of the tests. The results therefore do not establish norms, but may be regarded as representative of a Central African population. [For previous work, see this *Bulletin*, 1952, v. 49, 229.] *J. H. Birkinshaw*

GREMLIZA, L. Infektionskrankheiten in Südpersien. (Landkreis Soussanguerd.) [**Infective Diseases in the Soussanguerd District of Southern Persia**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Feb., v. 3, No. 3, 390–96, 2 figs.

Soussanguerd is in the Khouzistan Province of Iran ; the author gives brief notes on the chief diseases he met with during 2 years with a travelling dispensary (*ambulatorium*). The district is interlaced with streams and canals which afford ideal conditions for the spread of urinary schistosomiasis. A score of diseases are mentioned in this brief paper and the account of most is very sketchy, limited to 3 or 4 lines ; others are more fully considered. *Malaria* affects about 18 per cent. of the people ; both benign and malignant tertian infections are common, the latter accounting for more than half the cases ; quartan malaria has not been met with, nor were any cases of blackwater fever seen. Resochin is the drug of choice for treatment, aided by DDT petroleum spraying. *Kala azar* is endemic in Bostan, in the north-east of the district. The fatality is very high because patients do not apply for treatment till late. *Cutaneous leishmaniasis* is common on the face, hands, forearms and legs. Injection of solustibosan (on a single occasion only) around the ulcer leads to rapid healing within a fortnight. Illustrations show a leg ulcer so cured in 8 days. *Amoebic dysentery* is common and amoebic periproctitis abscess is far from rare. Success in treatment is obtained by emetine, sulphaguanidine, Yatren in pill form and Embarson [not defined]. *Syphilis* is intensely rife, infecting 80–85 per cent. of the population ; abortions are

frequent and many of the afflicted show keratitis and hydrocephalus. *Lymphogranuloma venereum* and *granuloma inguinale* are frequently seen, but the diagnosis from syphilis is not always easy; treatment by fouadin and solustibosan gives good results. *Leprosy* in the tuberculoid and mutilating forms is seen, but the number is uncertain, for many live in small boats and land only at night and in obscure places to sleep. *Trachoma* is the commonest of all the diseases in the district and attacks some 90 per cent. of the population. *Helminthiasis* includes infestation by tapeworms, *Ascaris* and *Enterobius* and, in particular, *Schistosoma haematobium*. Hookworm has not been found with certainty. The most successful treatment for schistosomiasis in the author's hands has been a 24-day course as follows: 1st day, 3·5 cc. of a 6·3 per cent. fouadin solution; for the next 4 days 5 cc. daily, on the 6th day 0·06 gm. of emetine and thereafter till the end of the course the fouadin and emetine on alternate days; that is, a total of 68·5 cc. of fouadin and 0·6 gm. of emetine. Other diseases, receiving little more than cursory mention, are: *smallpox*, 2 or 3 cases a month; *tuberculosis*, particularly arthritis of the hip and knee; *rickets*, *otitis media* following influenza, and *tetanus*. Five cases of puerperal tetanus are mentioned and 3 of tetanus neonatorum due to the use of dirty materials for tying the cord. Puerperal fever, strange to say, is not common in spite of the unhygienic conditions amidst which parturition is allowed to take place. *H. Harold Scott*

Pinotti, M. Considerazioni sulle attività del Servizio Nazionale di Malaria (Brasile). [**The Work of the National Malaria Service, Brazil**] *Riv. di Parassit.* Rome. 1952, Jan., v. 13, No. 1, 69–76. English summary (4 lines).

Although the Service retains the name of "Malaria Service" it carries out other important functions than merely anti-malarial measures. Of malaria there are 5 important vectors, namely, *Anopheles darlingi*, *A. tarsimaculatus*, *A. albitarsis*, *A.* (*Kerteszia*) *cruzii* and *A.* (*K.*) *bellator*; the use of DDT in amounts of 1·5–2·0 gm. per sq. metre—a 30 per cent. emulsion is used—has given good results. Each of a number of localities is mentioned, the annual average of cases, the use of Aralen (diphosphate of chloroquine) and the effect of DDT, matters of local rather than of general interest. Next, Chagas's disease is mentioned, the geographical distribution of the vectors and the distribution of cases of infection. Bancroftian filariasis investigation was undertaken in August, 1951. In Belém, the capital of Pará State, some 10 per cent. of the population of 200,000 had filarial embryos in their blood and it is estimated that 30,000 (15 per cent.) were infested. The chief vectors are *Culex fatigans*, *A. darlingi* and *A. tarsimaculatus* (*aquasalis*). Scorpion stinging is common and, in children, not infrequently fatal. In Belo Horizonte, the capital of Minas Gerais, 1,000 cases are said to occur annually among the population of 350,000. *H. Harold Scott*

BOOK REVIEWS

RUSSELL, Paul F. [M.D., M.P.H.]. **Malaria. Basic Principles Briefly Stated.** pp. xi+210, 64 figs. 1952, Feb. Oxford : Blackwell Scientific Publications, 24–25 Broad Street. [35*s*.]

A student who has other subjects to master and would get a knowledge of malaria as a whole finds himself bedevilled by specialists. There are specialists in parasitology, epidemiology, entomology, prevention and therapy. They give lectures, write papers and even books, but they usually remain specialists elaborating one particular facet of the enormous subject of malaria to the neglect or total omission of the others. The writers who have tried to write general accounts, giving a balanced statement of all aspects, are few and those who have succeeded are fewer.

Dr. Russell has tried and has succeeded brilliantly. He writes on a background of personal experience which for its scope and wide geographical distribution is hard to match, and what he says must in consequence be treated as authoritative. His book is short and within the capacity of the student reading other subjects, at the same time being sufficiently attractive to encourage him to study it. It covers all aspects of the subject : the parasitology, pathology, clinical aspects of treatment, entomology, epidemiology and control, and presents each of them in a lucid form which is sufficient for the student and which maintains a proper balance between them so that the book is not over-weighted in any direction. Though not encumbered with references it contains a useful bibliography which should enable anyone who wants to go further into the subject to make a useful start.

One of the difficulties of writing a book at the present time is the fluidity of the subject and the consequent difficulty in evaluating the importance of very recent developments. Dr. Russell takes very recent work into account and gives it mention but is conservative in its appraisal, clearly wishing to see some of it put to the test of time. He does not, for instance, accept the validity of the demonstration of the pre-erythrocytic forms of human malaria by SHORTT and his colleagues, preferring to say that the nature of the exo-erythrocytic forms and the development of mammalian plasmodia remains somewhat doubtful. He gives an alternative description based on analogy from avian malaria which the reader for whom the book is intended would find difficulty in following. It contains far too many technical terms—cryptozoites, schizonts, merozoites, metacryptozoites, phanerozoites, micro-schizonts, and micro- and macro-merozoites. Throughout his book Dr. Russell attempts not only to make himself understandable but also tries to give the reader a grounding on which he can understand other writers by explaining the meaning of terms which are used in the literature. The explanations are introduced naturally into the text and for the most part flow easily, but occasionally—as in this example—they are a little obstructive. He is also slightly conservative about treatment, and the student is likely to get an unduly pessimistic feeling from his general statement that the curative process is frequently prolonged over a year or two. Undoubtedly it is, but most tropical practitioners would tackle the treatment of *P. falciparum* malaria with an optimism about its duration which they could not get from this book. Neither does he differentiate greatly between the readiness with which *P. vivax* and *P. falciparum* malaria can be warded off by the use of prophylactic drugs.

In dealing with therapy he refers to drugs primarily by their U.S. pharmacopoeial names, though an ample synonomy is given. The British reader

might go slightly astray when he finds that proguanil is chlorguanide, and mepacrine is quinacrine, and as the book appears to be primarily published in Britain the British pharmacopoeial names might have been more appropriate. This is the only item of criticism of an excellent text book which should very quickly assume the position of the standard one for the general tropical student who is not, at the moment, trying to become a specialist in one of the facets of malariology. There are a large number of students to whom this description applies and who have long lacked a reasonable text book, but who should no longer feel the want. *G. Macdonald*

WEST, Luther S. **The Housefly. Its Natural History, Medical Importance, and Control.** pp. xi+584, frontispiece & 176 figs. 1951. London : Constable & Co. Ltd., 10, Orange Street, W.C.2, & New York : Comstock Publishing Co. Inc., Ithaca. [63*s*.]

This is an excellent book. It should prove invaluable to those interested in the house-fly either from the medical point of view or that of the biologist ; it contains a great deal of practical information but combines this easily with much that would appeal primarily to purely scientific interest. The combination results in a comprehensive treatment and presentation of the house-fly, *Musca domestica* (and its allies) which could otherwise be obtained only by reference to a very wide range of literature. A bibliography of over 1,000 citations represents about one-third of the papers which the author consulted. The book consists of 584 pages, clearly printed, and strongly bound ; many of the 176 figures are photographs.

An introductory chapter provides an interesting historical account of the growing awareness of the importance of the house-fly in human welfare and of the fluctuating attitudes of the public health worker, the research worker, and the public as the evidence accumulated to indict the fly as a carrier of disease organisms. Two chapters follow which deal, respectively, with the external morphology and with the internal organs of the adult fly. The former includes a well-illustrated treatment of chaetotaxy, and of the genitalia and their mode of function at copulation, besides an account of legs, wings, head and so on. The description of the internal anatomy is coupled with the detailed structure of the mouthparts ; and there is added interest in the association, throughout both this and the preceding chapter, of structure with physiological processes and function. In some cases, recourse is made to evidence of function from related species or genera but the application of the principles involved is always logical and acceptable. The chapter on the life-history of the fly deals with the subject on a wide basis. Here will be found not only an account of oviposition and morphological descriptions of the egg, larvae, and puparium but a discussion of emergence, dispersal, mating, flight range, longevity, fecundity, and the hibernation of the adults. Again, the considerable morphological detail given of the immature stages is related to function. This section is well illustrated with line drawings.

A chapter is devoted to taxonomy and nomenclature. The author acknowledges the privilege he has enjoyed in this connexion of consulting the unpublished work of Dr. E. G. MUNROE. No less than 204 species or subspecies have been created within the genus *Musca*. Of these, however, only about 60 valid species are accepted in the present work, the remainder being relegated to the status of synonyms of *Musca domestica* or other accepted species, or their subspecies. These are set out clearly in tabular form. Keys to species of *Musca* are not included but useful references are indicated to cover different parts of the world. The geographical distribution of the accepted species and subspecies is then discussed in the text, accompanied by tabulated data indicating in some detail the countries in which they occur and the more

outstanding characteristics of their habits and of their requirements for breeding. There are world maps on Goode's homolosine equal area projection showing species distribution by zoogeographical regions and the chief topographical and climatic features of different continents.

Food requirements of both larvae and adults are considered in one chapter. Particular consideration is given to the different types of pabulum in which breeding takes place, depending on species or subspecies, and even for the same fly in different parts of its distribution range. Experimental work on basic food requirements of the larvae and of the effects of overcrowding larvae are reviewed.

There is a chapter on the influence of temperature and humidity on the egg, larva, puparium and adult, attention being accorded to the rates of development of the immature stages in different natural environments and the effects of environmental factors on the activity and survival of the adults. Light, particularly its spectral quality, air movements, and other sources of stimulus are dealt with in a further chapter.

The subject of parasites and predators, symbionts, and commensals is considered in a comprehensive manner. The reader will find this chapter to be a remarkably informative and condensed treatment of the association of many bacteria, protozoa, helminths, other arthropods and vertebrate predators with the house-fly or its immature stages. It is here that organisms non-pathogenic to man and fly-borne parasites of veterinary interest are covered.

Much of the remaining three-fifths of the book is devoted to flies and disease in man and to fly control. The first chapter of those devoted to flies and human welfare discusses the evidence for the dissemination by flies of typhoid, paratyphoid, cholera, bacillary and amoebic dysentery, infantile diarrhoea, acute anterior poliomyelitis, giardiasis, conjunctivitis, trachoma and tuberculosis, yaws, anthrax, leprosy and plague. A section is concerned with house-flies as carriers of cysts of miscellaneous protozoa and the ova of helminths. A brief indication is given of the clinical consequences of infection of man with these organisms. The approach to the subject of fly-borne disease (which depends for much of its reality on circumstantial epidemiological evidence) is by a chronological review of events incriminating the fly from 1871 to recent times, together with a consideration of such laboratory work as demonstrated the competence of the house-fly as a carrier of the different infective organisms.

A chapter follows which is devoted to the general problems facing public health authorities undertaking fly control. Three further chapters deal with practical measures for the control of the house-fly. The first of these considers in practical detail every sort of measure which may be applied when it is urgently desired to control at once an established fly population. Here the author maintains a balanced view and, while including inevitably the use of DDT devotes a good deal of space to screening, fly traps, fly papers, poisons, and space sprays, and methods for the destruction of larvae. In the next chapter on planned control the problem is dealt with on the premise that prevention is better than cure. Modern means of sewage and waste dispersal in rural and urban communities are described clearly with excellent photographs illustrating the various services and installations necessary for the purpose. The storage of animal manures is discussed fully. Attention is given to the special problems arising in the tropics in regard to waste and sewage disposal and to various procedures of composting for manure.

The third chapter on control is on insecticides. It gives concise notes on the characteristics and usage of chlordane, toxaphene, methoxychlor, thiocyanoacetates, pyrethrins, and piperonyl butoxide and a rather fuller treatment of benzene hexachloride. But the greater part of the chapter is concerned with DDT for which chemical structure, properties, formulations, and

methods of application are described. The history of the development of DDT is traced and lessons are drawn from the results of numerous field observations on its value against flies ; there is a section on its toxicity to man and domestic animals, and the consequences to birds, fish and other animal life of widespread aerial spraying. The practical significance of DDT-resistant flies is discussed.

Several other chapters add appreciably to the practical value of the book, particularly to the biologist. For example, full instructions are available on rearing a laboratory strain of *M. domestica* under standard conditions and of several methods for testing insecticides against flies bred out under these conditions. There is also a very full treatment of museum and laboratory techniques including methods of collection, preservation and mounting, and histological techniques. A great deal of this is orthodox and applicable to a wide range of arthropods but its inclusion gives the book a further value as a manual of reference in entomological method in the field and the laboratory. The problem of efficient sampling of populations of adult flies is considered ; preference is given to Scudder's fly-counting grill.

There is an attractive chapter which attempts to assess the benefits conferred on man by flies ; this is not confined solely to *M. domestica* for which it is difficult to put forward a claim which is not more convincingly justifiable for some related fly or its larva. The value of the adult *M. domestica* as an experimental animal, particularly in insecticidal assay, is beyond dispute ; house-fly wings are used in an astronomical instrument which measures heat radiation from stars ; the scavenging habit of the larvae is, in principle, beneficial.

A chapter on dipterous insects concerned in myiasis completes the scope of the book. Full use is made of the comprehensive paper by James on myiasis [this *Bulletin*, 1948, v. 45, 1121]. A key and illustrations are given for the identification of the many dipterous larvae concerned ; a section deals with myiasis involving flies of the genus *Musca*, and another considers myiasis caused by various other related genera.

The past few years have witnessed the publication of several books concerned with some particular insect of first importance to human health and welfare. This volume meets a real need : it fully deserves inclusion in one's library of books on medically important insects. *D. S. Bertram*

Meira, João Alves. **Esquistosomiase Mansoni Hépato-Esplênica.** [The Liver and Spleen in Schistosomiasis mansoni] [Thesis for Chair of Tropical and Infectious Diseases, Faculty of Med., Univ. S. Paulo.] 607 pp., 133 figs. Bibliography. 1951. São Paulo.

This is the author's thesis for the Chair of Tropical and Infectious Diseases, Faculty of Medicine, University of São Paulo. He acknowledges in a preliminary note that, being pressed for time in getting the work printed by a given date, he has been able to revise the proofs once only and he includes 8 pages of *errata* ; the reviewer has found others not mentioned in these. One revision, if performed with care, should have eliminated most of them.

The work is divided into 8 chapters. In the first is given very fully the history of development of knowledge of hepato-splenic enlargement in schistosomiasis mansoni. This he divides into 5 periods : (i) When the condition was included in the term Egyptian splenomegaly and regarded as identical with Banti's syndrome (1902–1923). (ii) (1923–1928) Egyptian splenomegaly is ascribed to *S. mansoni*. (iii) (1928–1949) Discussions and opinions *pro* and *contra* the rôle of *S. mansoni* as the cause of hepatic and splenic lesions. (iv) Running parallel with (iii), the evolution of knowledge that hepato-splenic schistosomiasis was only one form of Egyptian hepato-spleno megaly, and comparisons

are drawn between it and studies on schistosomiasis japonica, Banti's syndrome and schistosomiasis in Venezuela, Porto Rico and elsewhere. (v) The present position in which enlargements of the liver and spleen are recognized as due to *S. mansoni*, with characteristic signs and symptoms and pathological changes.

This last period is the subject of the work under review and in chapter II are indicated in preliminary detail, in 84 pages, the relations between schistosomal hepato-splenomegaly, Banti's syndrome and hepatic cirrhosis, and it includes splenomegaly of mycotic origin, caused by species of *Aspergillus*, *Hormodendrum* and *Streptothrix*, and other causes of splenomegaly, intra- and extra-hepatic and the various causes of portal congestion contributing thereto. The author describes the different forms of hepatic cirrhosis and analyses the latest work on schistosomiasis mansoni with many references to the publications of recent writers up to 1951 ; GELFAND's work is abundantly referred to. He calls to mind the stages of the pathological process in the liver : granulomata due to the worm, circumscribed periportal cirrhosis, diffuse peri- and interlobular fibrosis with disorganization of the parenchyma and production of foci of epithelial regeneration.

Chapter III (124 pages) starts by the author relating his own studies, based on 65 patients, of ages between 13 and 54 years, 24 being between 19 and 24 years ; 54 were males, 11 females ; 47 were whites, 13 were mulattoes and 5 were Negroes. Fifty-six had bathed in contaminated waters, 3 washed clothes in such waters, and only one definitely denied all contact with infested water. In this chapter are tables of the distribution of prominent symptoms, general such as asthenia, pallor, wasting, oedema, anorexia, and more local such as gastro-intestinal, cardiac and respiratory. Also the results of physical examination, laboratory findings from faecal examination, biopsy or necropsy of the liver, rectal biopsy, intradermal reactions, comparing his results with those of others recorded in the literature. The author goes into very minute detail, some might think too detailed to be of practical service ; thus, 14 forms of inflammation of the rectum are mentioned among 51 cases. Appearances revealed by radioscopy of the oesophagus, the intestine and the chest are recorded ; plasma proteins were examined by the Takata-Ara, the formol-gel, and Hanger's cephalin-cholesterol reaction, with the albumin, globulin and the A/G ratio in 35 cases ; tests of liver function at the time of admission and after treatment, medical or surgical ; also of splenic function in its effects on the blood and its constituents ; corpuscle sedimentation, the cytology of the bone marrow, detailed in the text and set out in a table of 23 of the patients. Tests for syphilis by the Wassermann, Kline and Kahn methods ; for Chagas's disease by deviation of complement ; examination of the blood for malaria parasites, the Montenegro dermo-reaction, the Frei test and others.

Chapter IV describes the histopathology of the liver and spleen ; photomicrographs of the changes are reproduced in chapter VIII where very full details of 34 patients are recorded. Chapter V gives a clinical synthesis or general survey of signs and symptoms, and the physiopathogeny, a term implying the factors taking part in production of the enlargement, such as the worms themselves, their ova, their toxins and the tissue reactions thereto, the portal tension, etc. Next follows a short chapter on differential diagnosis, on the basis of the history, physical signs and the tests referred to in preceding chapters, and another short one on the evolution, complications due to the parasitosis and to intercurrent disease, and prognosis.

Chapter VIII, the last and longest (260 pages) starts with a few remarks on the treatment of 51 of the patients ; 29 were given Repodral or Fouadin, 8 had tartar emetic, 5 anthiomaline in addition to Reprodral, 4 had sodium antimony tartrate, 3 anthiomaline alone, 2 anthiomaline and tartar emetic. The last was given in a 1 per cent. solution in water, beginning with 5 ml.

(0·05 gm.), then doubling this, to a total of 0·95 gm. ; Repodral was given intramuscularly, 1·5 ml. the first day, 3·5 ml. the next, and after that 5 ml. to a total of 45 ml. Results of the different methods of treatment are minutely described—too minutely to be reproduced here. Readers interested should consult the text where they will find all they can want to know. This section is followed by a summary of the author's conclusions setting out clearly all that has gone before and details of 34 cases in which every conceivable information is given in accordance with the examinations and tests mentioned in chapter III. This section is embellished with more than 100 figures, 3 of them coloured, showing photographs of patients before and after treatment, of excised spleens, of histopathological changes and X-rays of the thorax, all excellently reproduced. Finally, there is a full bibliography of 31 pages and nearly 800 references.

The whole work bears evidence of a very careful, intensive and exhaustive study of one important aspect of schistosomiasis mansoni and there can be little remaining to be known in this regard. Professor Meira is to be congratulated on a splendid achievement in accomplishing so heavy a task.

H. Harold Scott

Poleff, L. **Introduction à la trachomatologie expérimentale.** [Introduction to Experimental Trachomatology] *Documenta Ophthalmologica.* 'S-Gravenhage. 1948, v. 2, 297–461, 15 figs. (1 coloured). [36*s*.]

This monograph of 130 pages was published in 1948. It provides a useful critical review of laboratory work on trachoma up to that date. The author has himself studied many aspects of his subject, working at Rabat in Morocco. His many papers have appeared in the years since 1936.

After a short introduction, the first major section is devoted to morphological studies. Many and detailed technical instructions are given for the preparation and microscopic examination of trachoma material. Then follows a generously documented account of the Prowazek-Halberstädter bodies, and of all the other structures, " primary initial bodies ", " secondary initial bodies ", " elementary corpuscles " and extracellular structures, which have been described in trachoma smears. The frequencies with which some of these structures have been encountered by workers in different parts of the world are presented.

There follows a discussion of the nature of the Prowazek-Halberstädter inclusions, which entails a critical appraisal of similar structures found in other conditions, such as inclusion blenorrhoea and " swimming bath conjunctivitis " (and even some cases of " spring catarrh " in which, according to Axenfeld, some authors have found them). The author, while clearly strongly disposed to accept the Prowazek-Halberstädter bodies as the specific causative organisms of trachoma, leaves this question strictly unanswered, and expresses the view that it may one day be surely answered with the aid of culture experiments.

A review of the filterability and centrifugation properties of the trachoma virus emphasizes the unsatisfactory lack of means of specific recognition of it, other than human inoculation. Throughout the book, the author frequently and rightly returns to this theme, which is fundamental to all " experimental trachomatology".

The section on experiments on cultivation of trachoma virus outside the body is detailed : clearly, this is a field in which the author has himself been very interested. He commences by recounting the standard tissue culture and tissue survival methods which have been used. This section, which deals with tissue culture *per se*, rather than with the cultivation of trachoma, is now a little outdated, for in recent years other methods have been introduced, and views on the subject are perhaps changing somewhat. Two paragraphs

devoted to the use of the developing egg present a rather extraordinary account of this technique, which is clearly one which the author has not himself used. [MACCHIAVELLO's account of growth of trachoma virus in the egg, this *Bulletin*, 1948, v. 45, 1112 ; *Bulletin of Hygiene*, 1948, v. 23, 1008, appeared too late for the author to have included reference to it.]

Passing to the culture of trachoma tissues, the author gives a detailed account of the work of various people, including his own. Much of this work has been vitiated by the inability of workers to test their cultures for the presence of infective virus. Poleff insists, again, on the desirability of testing on human subjects.

While several of those who have tried have, in their cultures, seen elementary bodies, most have failed to produce any Prowazek-Halberstädter inclusions. LEBER and PROWAZEK in 1913 saw atypical fine red staining inclusions in corneal explants held in human serum at 37°C. along with pieces of trachomatous cornea. RÖTTH is quoted as having seen inclusions in human embryo cornea infected with a trachomatous filtrate. Poleff himself has seen atypical inclusions in some of his earlier cultures.

After a considerable discussion of the probable nature of structures seen in tissue cultures, the author sums up thus : The conclusion from the work described in this chapter is that, in spite of considerable progress in the technique of culture of trachomatous tissue away from the body, one cannot state categorically that the problem of culturing the agent of trachoma *in vitro* has been solved. Although by these means one may succeed in obtaining multiplication of virus-like structures corresponding to the extracellular elements of the corpuscles of Prowazek, and may even observe in certain conditions the development of intracellular inclusions analogous to those of trachoma, irrefutable experimental proof of the specificity of such cultures is still lacking, for no one has yet accomplished the experiment of inoculating a pure culture into man.

With regard to cultures on the chorioallantoic membrane, the author describes 4 accounts, and concludes that the method deserves further attention, though so far the published accounts on this work are confusing and of doubtful significance. [MACCHIAVELLO's cultures, referred to above, were made in the yolk sac, a technique which Poleff does not mention, presumably because it had not then been used.]

The next sections deal with experimental inoculation of animals and man. Intraocular inoculation in rabbits and fowls may produce lymphoid follicles like trachoma follicles. Monkeys inoculated on to the conjunctiva have responded irregularly. Powazek-Halberstädter bodies are not seen in monkeys as a rule.

Much work on these lines has been done, and is reviewed by the author. Again, the difficulty of proving the specificity of lesions observed vitiates many experiments. The author, recounting his own experiments on rabbits' eyes, makes it clear that he is very conscious of this over-riding difficulty. He has, nevertheless, discussed at some length the pathological changes seen in such experiments.

Experiments on monkeys are given a special section, in which the atypical nature of trachoma produced by inoculation in monkeys is noted, and the possible fallacies of work with monkeys, due to spontaneous folliculitis, irregular susceptibility, etc., are discussed. BLAND's proof [this *Bulletin*, 1944, v. 41, 1060] that experimental trachoma in the grivet monkey could be transferred back to man after 4 monkey passages is, curiously, not mentioned, although Bland's paper appears among the references.

The last of the experimental sections deals with the experimental transmission of trachoma to human volunteers, and gives a valuable account of the development of the experimental disease as described by various workers.

Having presented his account of experimental trachomatology, the author next debates the question of Rickettsia *versus* Virus. Much of this debate is of rather superficial value. The author himself, summing up, expresses a compromise view, that the virus of trachoma is intermediate between the true rickettsiae and viruses of the psittacosis group. It seems likely that the author has been influenced by his own and other peoples finding that the Weil-Felix reaction may often be positive in sera from trachoma patients. This subject he deals with at length ; but he does not succeed in making the reviewer share his own views about it. Much depends on the technique of the test. Many accounts give inadequate information on this point. The author's own method, and that of several others who have found the Weil-Felix reaction positive in trachoma, depends on prolonged incubation of the test, first at 37°C. and later at room temperature. It seems clear that the reactions claimed as positive have, many of them, been of a very different order from those associated with rickettsial diseases.

The monograph ends with a short, not very informative, section on immunity. Treatment, chemotherapy and epidemiology are not discussed.

There is a useful though incomplete bibliography. Misprints are rather numerous, though not inconvenient ; the plates are not well reproduced. The monograph may be described as a useful reference work to a subject which, by reason of the difficulties of its experimentation, remains a very unsatisfactory basis for debate. It is essentially a review, and adds little new knowledge.

E. T. C. Spooner

Hackett, C. J. [M.D., F.R.C.P.] **Bone Lesions of Yaws in Uganda.** 194 pp., 133 figs., 1 map & 2 graphs. 1951. Oxford : Blackwell Scientific Publications, 24–25, Broad Street. [45*s*.]

Readers of this *Bulletin* who saw the late Professor Murgatroyd's comprehensive review of the monograph by Hackett on the bone lesions of yaws in Uganda [this *Bulletin*, 1949, v. 46, 472] will remember that the monograph at that time existed only in typewritten form, and that only 4 copies were then available for perusal. The monograph has now been printed with slight modifications, and this account of most careful and detailed work is therefore now easily available ; it is the only comprehensive account of the subject to appear since Botreau-Roussel's book in 1925 [*ibid.*, 1925, v. 22, 421], and it will surely be regarded as the classical work. The superb photographs and reproductions of X-ray films which illustrated the typescript version of the thesis have been reproduced, and although they have inevitably lost much of their quality in the process of reproduction by the half-tone process, they still remain a unique series of records of the pathological effects of yaws on bone.

The book is very well printed on art paper, and is attractively bound. The library of any student of yaws would be most seriously incomplete without it.

Charles Wilcocks

Simmons, J. S., Whayne, T. F., Anderson, G. W. & Horack, H. M., with Ruth A. Thomas & collaborators. **Global Epidemiology. A Geography of Disease and Sanitation. Vol. 2. Africa and the Adjacent Islands.** pp. xl+652, numerous maps. [Numerous refs.] 1951. London : J. B. Lippincott Co., Aldine House, Bedford Street, W.C.2. [£6.] [Summary appears also in *Bulletin of Hygiene*]

The first volume of *Global Epidemiology* was published as long ago as 1944, and it dealt with the countries of the Far East [see this *Bulletin*, 1946, v. 43,

86]. The same authors have now collaborated to produce the second volume, devoted to Africa and the Adjacent Islands. They have not only relied upon published literature for their information on the peoples and their conditions of life in the various countries, and on the diseases from which they suffer, but the Associate Author, Miss Ruth A. Thomas, A.B., M.A., M.P.H., who is Instructor in the Department of Tropical Public Health, Harvard, travelled widely in the winter of 1950, collecting up-to-date information. The authors express their indebtedness to many people who hold responsible posts in the countries surveyed, and who have reviewed certain chapters before publication. The fact that care has been taken in this way to ensure the accuracy and relevance of the information given is a guarantee of its quality. The difficulty with publications of this kind, of course, is to decide how much of the mass of available information should be left out, and to decide how those facts which are included should be presented.

The authors have wisely worked on a general plan, as follows. For each country they give information on geography and climate ; population and socio-economic conditions ; environment and sanitation ; health services and medical facilities ; diseases. They give a summary and a bibliography in each case, and a short general bibliography for the whole is also provided. At the end there are 7 maps of Africa showing the distribution of typhus, plague. *Schistosoma haematobium* infection, *S. mansoni*, human trypanosomiasis (*T. gambiense* and *T. rhodesiense* separately), and yellow fever, and a map showing air-lines and railways. These maps are followed by a valuable section on health hints for the tropics, by Dr. G. K. STRODE and his colleagues, which was first issued in 1948, and reviewed in this *Bulletin*, 1949, v. 46, 100. An index of subjects completes the volume.

The countries dealt with are grouped into regions : the Nile valley ; the Ethiopian highlands ; East Africa ; the islands of the Indian Ocean ; South Africa ; Equatorial Africa ; West Africa ; and Northern Africa.

Of course the information given is often scanty and over-compressed—it is not easy to compose an essay on so wide a subject as the health of the Union of South Africa in 25 pages, condensing information from 78 books and articles —but where the reviewer has tested this volume it has provided accurate and up-to-date facts, and has given a reasonably balanced picture of health conditions. *Global Epidemiology* is important in that the authors have studied and sifted so much information, and have summarized it ably and in such well ordered form that it is very easily found. It is a good book which will be of very great value as a work of reference. *Charles Wilcocks*

We record with the greatest regret the death of Dr. George Carmichael Low on July 31, 1952. Dr. Low was part-time Assistant Director of the Bureau in 1912–1914, and later served as a Member of the Honorary Managing Committee from 1932 to 1942

Printed in Great Britain under the authority of HER MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.
(400) Wt. P7/401 8/52 S.E.R. Ltd. Gp. 432.

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